

CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION."

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THE ECONOMIC VALUE OF BIRDS.

By HAROLD C. BRYANT.

The economic or dollar and cents value is but one of the values pertaining to bird life. At present this is the value most emphasized but it is not necessarily the only basis for an estimate of a bird's worth. It is to be hoped that a basis of valuation which takes into account all tangible values will be more widely used in the future. However, this presentation will be limited to some of the outstanding values of bird life from the dollar-and-cents viewpoint.

As a rule we have decided upon a bird's value entirely upon circumstantial evidence. If a bird were found in a field it was at once supposed that it was eating grain. If a bird were seen in an orchard tree, it was at once supposed to be eating fruit and so immediately

blacklisted. In more immediate years, an attempt has been made to base valuation on more dependable information. Consequently, we find men now engaged in the study of the food of birds attempting to find exactly what a bird does in the open and exactly what it eats.

WESTERN MEADOWLARK

PROPORTIONS OF DIFFERENT KINDS OF FOOD FOR THE YEAR

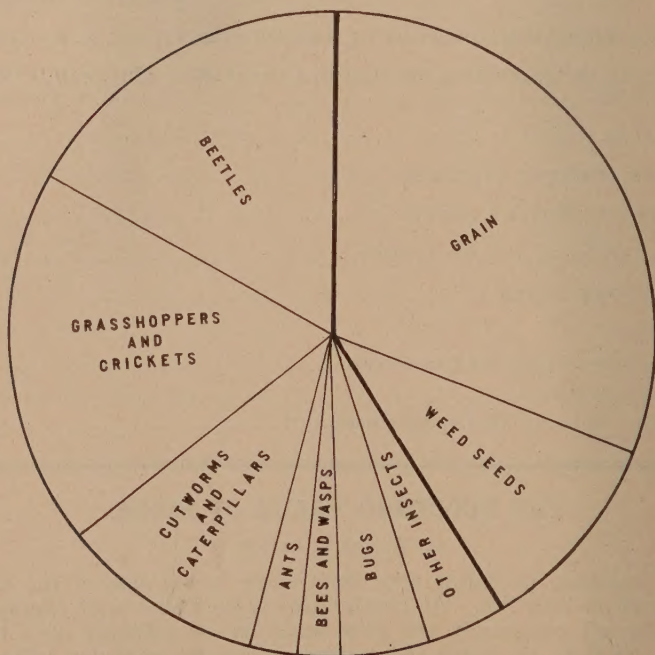
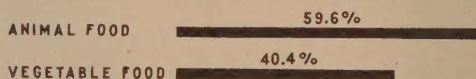


FIG. 1. Diagram showing relative amounts of various items in the diet of the western meadow lark as computed after a study of the stomach contents of nearly two thousand birds taken at all seasons of the year.

A Frenchman was the first to actually show what a bird eats by exhibiting the stomach contents. He prepared charts by pasting the different elements of food on cardboard. This evidence was shown to the French Academy of Science, to demonstrate exactly what various

birds were eating in France. Then a man in New Jersey adopted this method of stomach examination and investigated the food of the robin.

In 1895, the Federal Government became interested in placing a valuation on our common song birds. A bureau of the United States Department of Agriculture undertook some investigations of the food habits of birds. Investigation continued until now there is a mass of literature dealing with the food of birds. Over one hundred thousand stomachs of birds have been examined by the Bureau of Biological Survey alone. Data on the food of almost any North American species is available. A bibliography dealing with articles on the food of birds in North America by W. L. McAtee (U.S.D.A., Biological Survey Bull. 43) is available and will furnish abundant references for those interested.

If we study the matter we find that birds occupy a very important place so far as control of insects is concerned. There is a wonderful balance in nature. Were it not for the tree, certain insects could not live; if it were not for the insects, certain birds could not exist; and in turn, but for certain birds the trees could not exist because of the control of the insects by these birds. True, birds are not the only check on insects. Parasites, climatic conditions and other factors form checks on insects, but birds do play a part and a very important part in insect control. It has often been pointed out that if insects were not held in check they would soon populate the earth. In some instances, thirteen broods of young are reared each year and the increase is tremendous. There are said to be 400 insects injurious to the oak, 165 injurious to the pine and 186 injurious to the willow. What chance would the trees have if insects were allowed to propagate unchecked!

The following proofs that birds act as an important check on insect life are offered: *First of all most birds eat insects, and some birds eat nothing but insects.* Many birds that feed upon weed seeds or grain during the winter season always turn their attention to insects during the spring when they are feeding their young. Many birds appear to turn their attention to grain only in winter when insects are not available. Examination of thousands of stomachs of such birds as wrens, flycatchers and swallows show that these birds feed entirely upon insects. More than 99 per cent of the food for the entire year for these birds is made up of insect food.

Along with this continual demand for insect food on the part of the bird we discover some very interesting adaptations for the catching of insects. The flycatchers, for instance, have rather broad flattened bills with which to snap up insects. An additional aid in capturing insects in the air is to be found in some hair-like bristles at the corners of the mouth; these really increase the size of the mouth and the bird is enabled by them to know when it has captured an insect, or when an insect is about to escape.

Birds known as nighthawks, in reality not hawks at all, sometimes called "goatsuckers," have very large mouths. In the evening these expert flyers capture insects in mid-air with but slight deviations in their flight.

The hummingbirds have a very long slender bill adapted for searching in the cups of tubular flowers. They do not feed entirely upon nectar but also upon insects found in the corollas of flowers.

Woodpeckers have wonderfully adapted structures which enable them to secure insect larvae from beneath the bark or even down in the wood of the trees. First of all they can cling to the side of the tree. Their feet, instead of having three toes forward and one backward, as is the case with most birds, have two forward and two backward, so they are enabled in this way to clamp pincher-like onto the side of the tree. The tail feathers are strong, stiffened and pointed to act as a support, for the woodpecker in reality becomes a shelf on the side of a tree. The bill is chisel-like. Strong muscles in the head and neck allow the bird to deliver rapid and strong blows against the side of the tree, sufficient to chip off the bark or even the wood itself. The tongue of a woodpecker is long and is arranged in such a way that it can be protruded a long distance out of the mouth. The hyoid cartilages extend from the base of the tongue back over the

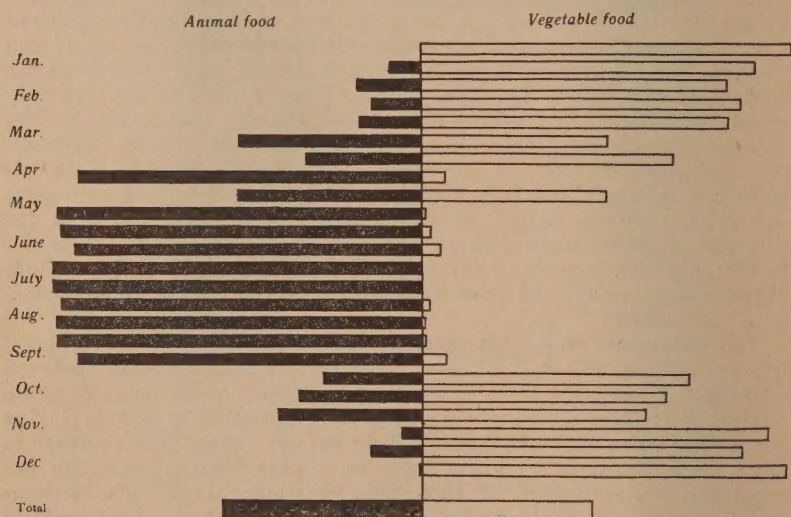


FIG. 2. Diagram showing the change from animal to vegetable food during late fall and winter. Computed after stomach examination of a series of western meadowlarks taken at Newman, Stanislaus County, California.

top of the head in a little groove and each cartilage then terminates below the eye or in some species near the tip of the bill, after passing through one nostril. These cartilages act like a spiral watch spring uncurling and allowing the tongue to protrude much beyond the tip of the bill. Almost no other bird has such a long tongue, a tongue capable of reaching deeply into the tunnel of a wood-borer. At the tip of the tongue are found some little barbs with which to impale the larva when it is found.

Next, *birds have a great capacity for food*, and consume large quantities of it. Attempts have been made to find out exactly how much food birds need. The easiest way to determine this was to hold young birds in captivity and by weighing the food find out just how much they needed. One man experimented with young robins. He found that a robin one week old would eat 31 cutworms and earth-

worms in a day. On its 16th day, he fed each bird 68 earthworms which amounted to over one-half the weight of the bird's body. Another man worked with crows; he found that young birds before they leave the nest need at least one-half their own weight of food every day in order to survive. Estimates have been secured also by watching birds as they feed their young and counting the number of trips made to the nest. In the eastern United States a red-eyed vireo's nest was watched for ten hours during which time the two parent birds made 125 trips to the nest. One of the best records, however, was that made by a pair of grosbeaks, in the eastern United States, which made 426 trips to the nest inside of eleven hours.* Caterpillars formed the main item of food. A pair of chipping sparrows succeeded in carrying food to their young on 182 different occasions during one day.*

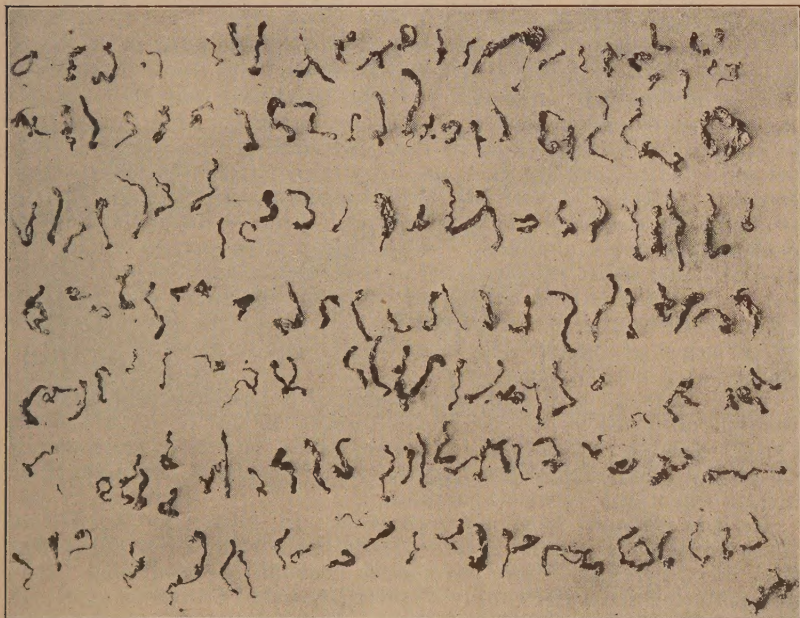


FIG. 3. The 192 small cutworms shown above were taken from the stomach of a western robin secured in Inyo County, California.

We have still another method of estimating the food necessary for a bird. This is by ascertaining the amount of food in a bird's stomach and then determining the rapidity with which the food is digested. The United States Department of Agriculture has found 500 mosquitoes in the stomach of one nighthawk. An examination was made of the stomach contents of a red-shafted flicker, and there were found 5000 ants which had been eaten at one meal. One hundred whole beetles have been taken from the stomach of a cliff swallow. I have taken 66 large cutworms and 16 beetles from the stomach of a meadow lark and out of still another one 44 beetles. One hundred and ninety-

*Forbush, E. H. 1921, The utility of birds. Dept. of Agri. Commonwealth of Mass. Dept. Bull. No. 9.

two cutworms were taken from one robin's stomach, a bird secured in Inyo County. Turning to weed-seed eating birds, we have even larger numbers. From the stomach and crop of one mourning dove have been taken 7500 weed seeds, from another 9200 weed seeds. This should be sufficient evidence that birds do need large quantities of food.

Birds also have very rapid digestion. By feeding captive birds known quantities of food and then examining their digestive tracts after a lapse of time, the rate of digestion can be ascertained. Experiments of this kind have shown that non-game birds digest a meal in from two to four hours. This means that one of these birds needs at least three meals each day. For instance, in estimating the food of the robin mentioned above, multiply the 192 cutworms eaten at one meal by three and we get some idea of the amount the robin might have eaten in a day. Not only is there a great capacity for food but there is also a rapid digestion of it.

Still more important is the relation which birds have to an insect outbreak. Insects are not necessarily always injurious until they appear in abnormal numbers. If it can be proved that birds eat the insect most abundant then they play an important role at the time of an insect outbreak. Now we have considerable evidence that birds act as a police force or as a standing army; ready to move across country to where insects are most numerous. Forbes* in Illinois studied very carefully the food habits of birds in an orchard where cankerworms were abundant. Observations were carried on in two orchards, one where cankerworms were abundant and the other where they were present in fewer numbers. Results showed that birds in the orchard where the cankerworms were numerous, were taking a much larger percentage of cankerworms than in the orchard where worms were not so numerous.

Many years ago a university professor in Nebraska investigated the relation of birds to the periodic outbreaks of the Rocky Mountain locust. He found that practically every kind of a bird, from one of the size of a hummingbird to one the size of a pelican, fed upon these insects when they became abundant.

Here is evidence from our own state. In 1911 near Mt. Shasta there appeared a plague of caterpillars, black hairy caterpillars that feed on *Ceanothus*. They gave much trouble by defoliating brush and polluting the water supply of several towns. Still later of course there followed myriads of butterflies. Butterflies were so abundant that hundreds could be counted inside one square foot on moist ground where they gathered to drink. Now as a rule birds do not eat butterflies. They do not seem to like butterflies although we do not know just why. However, an investigation showed that five California birds had turned their attention from their usual food and were feeding largely upon these butterflies, brewer blackbirds, western kingbirds, and meadow larks taking the larger number.

Periodically there is an outbreak of grasshoppers in some portion of our great valleys. A census was taken of the number of birds in a region so infested which showed that birds were unusually abundant. A census taken in another part of Merced County, similar in character but where grasshoppers were not so abundant, showed that the birds

*Forbes, S. A. 1885. The regulative action of birds upon insect oscillations. III. State Lab. Nat. Hist. Bull. 1.

had actually moved across country to where the insect food was most abundant and most easily obtained.

Everything points to the fact that birds actually turn their attention to the insect most available and in so doing they must bear an important relation to the control of an insect outbreak. We do not know how many outbreaks may have been stopped by birds before the insects became apparent. Of course we can not depend upon the birds alone for stopping insect outbreaks, but certainly we should consider them an important natural method of control.

Birds may have a relation to weed control. Many plants are very prolific. They produce thousands and sometimes hundreds of thousands of seed annually. Here again plants would very easily take the earth if certain control measures were not to be found in nature. By stomach examination it has been found that one dove had eaten 9200 weed seeds for a single meal. Many states are wondering if the dove is not more important as a weed destroyer than as a game bird. The goldfinch prefers seeds of dandelion and sunflower, cosmos, etc. In captivity they appear to need seeds of this sort. Some birds in taking

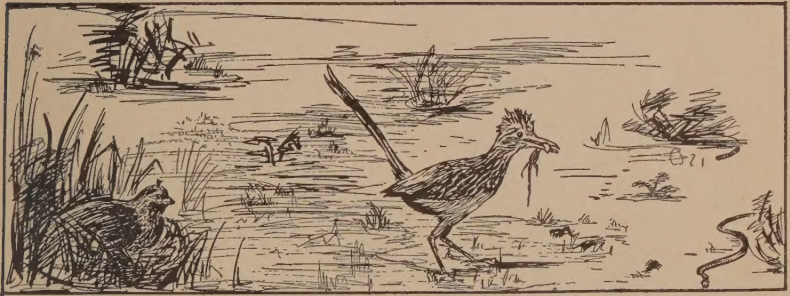


FIG. 4. The roadrunner, often accused of destroying the eggs of quail, feeds largely on insects, mice, lizards and small snakes. Judging from many examinations of stomach contents it must be only an occasional individual that destroys nests and eggs of other birds.

certain kinds of seeds become seed distributors. Occasionally they may help to spread plants we do not wish distributed. For instance, the red-shafted flicker sometimes eats the seeds of the poison oak. These seeds are not digested but are sometimes carried many miles away. Thus, this bird may really play an important part in seed distribution.

The most evident good accomplished by birds is the destruction of rodents. Hawks and owls are considered our best rodent destroyers. Some men are willing to pay their boys ten to twenty-five cents for every gopher captured. A pair of barn owls have been known to capture ten gophers in a single night and carry them to their young. Most of the hawks and all of the owls are extremely beneficial because they destroy the very things that we wish to have destroyed. The marsh hawk is an excellent mouser, likewise, the roadrunner, although he feeds largely on lizards and snakes. From the stomach of a great blue heron I have taken two large pocket gophers. Most readers are aware of the good work of this bird in alfalfa fields.

Game birds have a very evident food value but although this may be emphasized, their part in insect and plant control could likewise be demonstrated.

To balance the harm against the good accomplished by each kind of bird becomes the duty of every complainant of the depredations of birds, for quick judgment seldom leads to the truth about a bird's food habits. Furthermore public sentiment supports both federal and state laws giving protection to all insectivorous species.

It is hoped that the economic value of common birds has been convincingly presented by showing their relation to insect and rodent control. The good accomplished is the more evident because of adaptations for catching, large capacity, rapid digestion and habit of taking insects most abundant. Realization of the part played by birds should be common knowledge to both old and young so that natural resources may be better appreciated and protected.





Fig. 5. Ring-neck pheasant, a famous game bird now being propagated at California's new game farm at Yountville, Napa County.

CALIFORNIA'S NEW STATE GAME FARM.

By HAROLD C. BRYANT.

The California Fish and Game Commission and the sportsmen of the state are planning to place California in line with other states in game propagation. Few states have accomplished more in acclimatizing food and game fishes, but thus far little has been accomplished in the introduction of game. Believing that the time is ripe for concerted effort in the propagation and acclimatization of game birds, a pretentious program is planned.

A start was made last fall when 5600 young ring-necked pheasants were purchased in Washington and liberated in Inyo, San Diego and

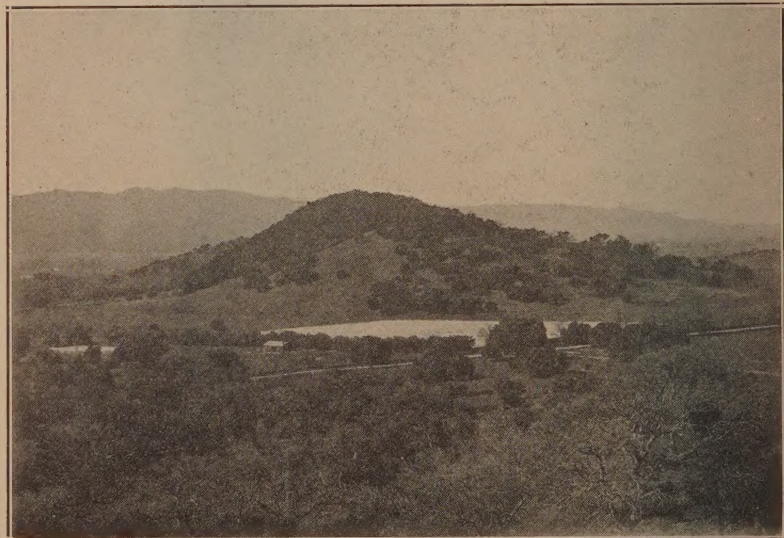


FIG. 6. Rearing pens at the new State Game Farm at Yountville, Napa County. An area of $7\frac{1}{2}$ acres is under cover and there are 472 pens.

Stanislaus counties. Favorable reports have been obtained of these introductions.

Before another month is past, California will own one of the largest and best equipped game farms on the Pacific coast. For several months past a visit would have shown a scene of great activity. More than twenty men were employed: carpenters busy with the storeroom, others erecting fences and plumbers installing water pipes.

In order that no mistake might be made as to the site the Commission secured the expert advice of Mr. Gene M. Simpson, Superintendent of the Oregon game farms. On looking over several suggested sites, one on the state-owned farm at Yountville, Napa County, was selected. Soil and climatic conditions are ideal. Situated in the foothills near typical quail country, fifty acres have been appropriated for use. The main enclosure includes about seven and one-third acres. This area is surrounded with a vermin-proof fence placed on a cement footing and is

completely roofed with wire. There will be 472 pens, 24 by 24 feet. The famous Pendleton farm in Oregon has but 324 pens. Driveways for the feed wagon and a complete watering system will be provided. By a system of runways it will be possible to move birds from one pen to another without catching them. Homes for the superintendent and help are to be built.

In that fifty acres have been set aside for the use of the farm, there will be adequate fields for portable pens and for the growing of food plants.

Recent successes in game farming have largely been due to efforts to simulate natural conditions within the rearing pens. Formerly birds were reared in an open pen containing no growing food and no cover. At the Yountville game farm no expense has been spared to furnish



FIG. 7. The rearing pens at the new game farm at Yountville showing the arrangement of the pens.

growing food in every rearing pen. A sprinkler system has been installed which will keep alfalfa, kale and other plants watered and growing. Every pen will have moist conditions in half of it and dry conditions in the other half. The growing food plants give the birds shelter and teach them to forage so that if they are planted in the wild they know how to find food. Another advantage with growing plants within each pen is that plant life attracts insect life and pheasants must have some insect life in order to thrive.

Already shipments of pheasants have arrived, and before the laying season begins the pens will be ready. The choicest of breeding stock has been secured from Oregon and Washington. Hundreds of setting hens have been secured to hatch and mother the chicks. Where a few hundred birds were reared on the old Hayward game farm it is planned to rear thousands on this new farm.

The valley quail situation calls for action and plans are being made to propagate this native game bird in the hope of replenishing depleted game covers. British Columbia and Washington are boasting of the Hungarian partridge and attempts will be made to propagate this bird in sufficient numbers for stocking. Every effort will be made to furnish in large numbers all of the game birds suitable for acclimatization in the cultivated districts of the state where native game has disappeared.

Activities in connection with the propagation and introduction of game is vested in a Bureau of Game Farms. Mr. August Bade, a successful game farmer of Washington, has been retained to superintend the work. He is stationed at the Yountville farm and on him will rest the responsibility of a large annual output from the farm.

This new activity in game farming comes after nearly a ten-year



FIG. 8. A sprinkler system is to be utilized in watering the food plants to be placed in every pen. Half of each pen will furnish dry conditions, whereas the other half will be a mass of vegetable growth suitable for both food and cover.

period of lack of interest in this method of game conservation. From 1908 to 1916 numerous pheasants and quail were reared on a game farm at Hayward and distributed. Wild turkeys were also reared.

Previous to state endeavor along these lines, many private individuals had attempted propagation and introduction. Some of these ventures were attempted as early as 1893. A number of pheasants were purchased by the Fish and Game Commission in Oregon in 1894 and given wide distribution. In 1908 the commission purchased 3500 Hungarian partridges, some of which were used for breeders at the game farm. Other early attempts included the attempted introduction of the Chinese quail, bobwhite, Gambel quail and several species of Mexican quail. In all, more than a dozen species of game birds were introduced. In most instances these introductions were followed with optimistic reports

of success but, with the exception of the ring-neck pheasant, none of these birds established themselves.

Successes in Oregon, Washington and British Columbia give California sportsmen encouragement. If the state because of a long history of past attempts can now profit by its mistakes, time and energy will not be wasted and California will line up with other states that have been successful in establishing exotic game birds. Nothing in recent years has shown so earnest an attempt at improving hunting conditions as the move to propagate game birds in large numbers.

MONEY IN THE BANK.

By W. L. SCOFIELD.

(Contribution No. 59. Department of Commercial Fisheries.)

We all know that the game and fish of this state belong to the people of California and most of us recognize that they are of great value from several points of view. However, some of us are not so aware of the fact that the marine fishes along our coast comprise a resource of the state that each year yields a return of millions of dollars.

The people of the state, as owners of these commercial fish, are in the position of the man who is notified that he has been left a large legacy, a sum of money on deposit in the bank, a sum upon which he can draw at will. His first question naturally is "How much money is there?" He is told that no one knows the amount of the legacy; no one knows how many fish are in the ocean and there is apparently no method of finding out. It is known only that the sum is large and that he can draw as much as he pleases. This man, being blessed with common sense, said "If the sum is very large, the interest each year must be large so I will adopt this policy: I will draw each year only the interest on this sum and leave the principal untouched so that I may continue to enjoy this legacy throughout my life and my children also may enjoy it." If he had been foolish he would have decided to squander it by overdrawing and have nothing left in the end, but instead, he decided on a policy of wise use, in other words he (the people) adopted the policy of conservation.

Most men, and some women, keep a record on the check book stubs of how much money they draw from a bank, and the particular man we are here considering decided to keep such a record. California was a pioneer in adopting a system of accurately recording the catch of fish in the state, and our triplicate receipt or "pink ticket" system is the foundation for our knowledge of commercial fishes.

Our man, having decided to draw only interest and leave the principal intact, is next confronted with the outstanding all-important question of "How much may I draw each year?" Since the total sum is not known, the exact annual interest can not be computed before drawing from the bank. There is left but one thing for him to do, that is, draw some money, and, when he thinks he is overdrawing, cut down on the sums drawn. This is the trial and error method necessary when exact calculations are not possible. But how can he know when he is overdrawing? An off-hand examination of the sum drawn from the bank does not tell him whether this money is just interest or is part interest and part principal. He might go on for years digging

into the principal and not know it or he might draw each year a sum far less than the annual interest and be unaware of his lost opportunity to enjoy the full amount of the interest.

This sensible man decided to invest a small portion of the money drawn in hiring an expert in such matters to tell him whether or not he was overdrawing his quota of interest money at the bank. In this way there was established in California a research branch of the Commercial Fisheries Department of the Fish and Game Commission. Our man with the legacy rightfully expects eventually to get value received on the money so invested in research. It is the purpose and the duty of this department of research in commercial fisheries of California to give to the man with the money in the bank the answer to the question most important to him—"How much may I safely draw each year?"

The carefully considered program of research adopted by the State Fisheries Laboratory is directed toward answering the one most important question of how much can be drawn each year without digging into the principal. Stated in other words—when is overfishing occurring? Strange as it may seem, this question has been given very little consideration in the past, so there is no accumulation of knowledge on the subject resulting from work done elsewhere, and it has been necessary to start with an almost clean slate. At another time we hope to discuss with readers of CALIFORNIA FISH AND GAME the methods used in arriving at an answer and to present something of the difficulties and complications met with in trying to answer the question; but here we are interested in defining the question to be answered. It seems that we all do better when we first determine just what we are going to explain before we start explaining anything, and in fisheries research it is desirable to understand where we are going before we start anywhere and before we decide on the route to be followed.

The man with the money in the bank is not overly interested in the why of things, he wants to know what amount of interest can be drawn. Applied to any one particular fishery we must first find out what is happening in that fishery before trying to explain why it is occurring or might occur. The complete answer to the question of overfishing will undoubtedly involve the reasons for occurrences, but the chief question is one of *what*, not *why*. In this particular fishery, is the commercial catch greater than it should be or less than it might be with safety?

Should we study the life history of a certain fish, its spawning habits, its food, its migrations and the ocean currents or temperatures that might govern its movements? Perhaps so if we can see where such questions will tie in with the goal at which we wish to arrive; that is, the determination of overfishing. The above questions are big ones and there is very little known about them to start with, so the road toward answering them will be long and rocky; but that need not frighten us if the road leads to our goal. There is a more certain and possibly more direct route that gives much promise of leading us toward determining overfishing. An examination of the commercial catch itself gives promise of answering the question we want answered. The two methods for examination of the catch to determine overfishing

have been discussed elsewhere, so need only be mentioned here as studies of boat catches from year to year and changes in the normal proportion of age or size classes in the catch from year to year. We expect such studies to answer directly the question of overfishing and to determine at what point the money drawn from the bank ceases to be interest and begins encroaching on the principal. We do not expect the answer to be quickly and easily forthcoming, for unfortunately we have found this road also to be long and rocky. The full understanding of the catch may involve most if not all of the difficult questions as to life history and habits of the fish, but of themselves they do not promise much in the way of a direct answer to the most important question of how much money our man should draw from the bank each year.

The commercial catch is by no means a simple thing and the supply of fish is subject to natural fluctuations. If the legacy in the bank is in the form of common stock of a somewhat unstable or seasonable industry, the value of the legacy fluctuates and the interest rate is changeable so that our man will no doubt have to figure his interest as averages over a period of years. Suppose this money is common stock of a cotton mills company. To foretell possible future fluctuations, our man may wish to know about cotton milling, sale of goods, or even purchase and production of raw cotton, provided he is unable to learn about these fluctuations from a direct examination of the amounts he is drawing from the bank each year. But after all, what does the man receiving the legacy care about cotton? If he is interested at all, he will wish to know about cotton only as it affects the amount of interest he is able to draw from the bank.

The owner of the cotton stocks has hired an expert for the one primary purpose of distinguishing between interest and principal in the money drawn from the bank. Should this expert study cotton? If he goes in for an exhaustive study of cotton, will he be in a position to answer the question the owner of the cotton stock is asking him? It would appear that the expert might better start with an examination of the money drawn from the bank, since it gives promise of solving directly the primary question.

By some such line of reasoning, the staff of the State Fisheries Laboratory decided to first examine the commercial catch to find out what was happening there before becoming involved in questions of why something happened. The laboratory staff conceives its chief duty to be the examination of the commercial catch to determine whether or not overfishing is now occurring. This involves a study of the catch to learn the signs by which overfishing manifests itself. These signs were not known. In fact, very little is known about overfishing and there is no store of information to draw upon, so we are having to find out for ourselves and incidentally blaze a trail that should help others as well as ourselves later on in the study of other fisheries. We are limited as to staff and funds, so have concentrated on the two most important commercial fisheries of the state, sardine and albacore. We are earnestly striving toward the answer to the chief question and already have learned a number of valuable things about the catch and what may be expected of it. We hope to show the man with the money in the bank that his judgment was sound when he

decided to venture a small investment in research to determine essential facts rather than going it blind and trusting to luck.

Transmitted November, 1925, San Pedro, California.

PURSE SEINES FOR CALIFORNIA SARDINES.

By W. L. SCOFIELD.

(Contribution No. 58. Department of Commercial Fisheries.)

In the first years of sardine canning in California the only net that could be depended on to take large quantities of fish was the purse seine, but this gear fell into disrepute and for ten years was classed as obsolete while another type of net was universally adopted. Within the last few months there are indications that the discarded purse seine is staging a comeback and may again dominate sardine fishing in this state.

The first catches of California sardines in sufficient quantities to be considered commercial catches were made in gill nets, that is nets with a mesh of such size that the sardine could push his head into an opening in the net, but in backing out would catch his gill covers in the webbing and thus become entangled. Gill nets are still used occasionally for sardines, but the catch is very small and this method of fishing is employed only for supplying a small local fresh fish market or for catching sardines to be used as bait for some other fish.

When sardine canneries were established* in California it was found that gill nets could not supply the plants and it became necessary to employ the purse seine. This net is of small mesh but is very long so that it can be laid out in a circle around a school of fish, the webbing hanging like a curtain about the school. A strong line run through rings at the bottom may be pulled to close the net at the bottom, thus trapping the fish in the pocket or purse formed by the net. This type of fishing gear enabled fishermen to capture enough sardines to keep the small capacity canneries of the early days supplied with fish part of the time, but the catch was uncertain, was fluctuating in amount and frequently failed when fish were most needed at the cannery.

There were several reasons why the purse seine of early days failed to yield a steady supply of fish. In the first place the fishermen were not familiar with the habits and movements of the sardine. Schools were located by seeing fish jump at the surface or by seeing the fish in shallow water in the day time, and fishing at first was confined to the daylight hours. Later it was discovered that sardines could best be located at night by the phosphorescent light resulting from their movements in the water, and as a result daylight fishing was gradually abandoned, especially at Monterey. The early purse seines were circled by hand from skiffs and pulled by hand, with the result that the "lay-out" and "pursing" were delayed and the hand work required a crew of ten to twelve men, thus running up costs of operation. Another reason for early failure, at Monterey at least, was the fact that gear

* The Golden Gate Packing Company built the first California sardine cannery in 1890 at North Beach, San Francisco, but about two years later the equipment was shipped to the newly established Southern California Fish Company at East San Pedro, where canning was begun in 1892. At Monterey, Mr. F. E. Booth started packing sardines in 1902 and built a cannery in 1903 under the name of Monterey Canning Company.

(net and boats) was furnished by the cannery, and fishermen were paid wages by the month so there was small inducement to scout for fish or to acquire the knowledge necessary for success in a new fishery. Most of the early purse seining (before 1905) was confined to shallow water, because in deep water the sardines were almost sure to be frightened and duck under the lead line before the net could be "pursed" by hand. During most of the year sardines were not to be found in shallow water in the daytime.

In spite of the crudities in the purse seine method of fishing, this net furnished all the sardines used by the canneries up to 1905, and its use was continued till 1915 at least and possibly a year or two later. There were improvements in the construction of the net, but the greatest advance made in method of fishing was the use of a power boat in "laying out" and a power winch to purse the net. This cut down operating time and the net was more and more used in deep water so that the purse seine became more successful in later years, but it failed to hold its own in competition with a new type of Mediterranean net introduced into California from Algeria on the north African coast.

The great drawback of the old style purse seine, aside from cost of operation, was the fact that slow pursing allowed sardines to "dive" under the lead line. Petro Ferrante, an experienced and inventive Monterey fisherman, suggested that the net called "lampara" used in the Mediterranean might solve the difficulty as it had a large bag into which the fish might be driven before they "dived." Accordingly in 1905 Mr. F. E. Booth sent to Tangier and purchased one of these nets which promptly tore to pieces the first time it was used, but from it, as a model, other "lamparas" were constructed and used at Monterey. They were successful from the first and revolutionized sardine fishing in California. The lampara was soon adopted in Southern California as it yielded a greater and more continuous catch and was cheaper of operation. A crew of nine men with a lampara could do the work of ten or twelve men with a purse seine. However, the discovery of night fishing and increased skill and knowledge were contributing factors to the success of the lampara and the purse seine continued in use for day fishing until 1915 or later, but the purse net was steadily being supplanted by the new type of gear.

The lampara is a highly specialized net with long wings of very large mesh serving to frighten the fish into the large bag of small mesh. The large mesh permits of the lead line being pulled rapidly so that it partially closes the bottom of the net, but the action of the net in the water is somewhat that of a scoop such as used by grocers with the small mesh bag holding the catch.

The lampara was used in addition to the purse seine equipment for the ten years following 1905, and for the next ten years (1915-1925) it was the only net used for sardines with the exception of the Japanese round haul net which is merely a modification of the lampara and is operated in the same manner and is built on the same plan as the Mediterranean net. The "round haul" net of southern California is almost identical with the lampara used at Monterey.

The purse seine although crowded out of the sardine fishery by the lampara was by no means forgotten, and by 1915 was being used in the catching of barracuda, white sea bass, yellowtail and mackerel in

southern California.* Later this net was used for tuna, and by 1920 the estimated number of purse seine boats operating was placed at 100. It soon became evident that there were too many boats so engaged and many of these fishermen have been forced into other lines of work.

In January of 1925 the owner of one purse seine boat at San Pedro procured one of the old small mesh purse seines and decided to again try out this old time gear on sardines. He met with success and by the middle of November, 1925, there were 25 purse seines employed regularly in the sardine fishery of San Pedro. Other such nets are being ordered and the purse seiners feel confident that the worm has turned. They think the dethroned purse seine will drive out the lampara and in a short time will again dominate sardine fishing in this state.

The reasons given for the return of the purse seine are many and somewhat contradictory. The purse seiners claim that this net is proving more successful than the lampara or round haul and that they get larger catches with less effort. The purse seine is credited at San Pedro with being superior on nights of rough weather, in fog and when sardines are active or "wild." It is claimed that power hauling of the net is quicker, cheaper and more successful in catching fish than the hand pulled lampara. It is possible that purse seiners forced out of other fisheries are of necessity turning to sardines to save their investments in boats. It is also possible that the skill and general experience gained in purse seining for other species is proving so valuable that the purse net is actually more successful now than other types of gear. Many of the present purse seiners have also had round haul experience in the sardine fishery so are more familiar with the sardine than the early purse seiners. This much is certain, the large purse seine boat with its deep hold will carry a larger tonnage of fish than the round haul launches used at present in San Pedro. These launches carry the catch on deck by using side boards, whereas the Monterey fishermen employ lighters or barges for transporting the catch. Lighter capacity can be increased indefinitely. Round haul fishermen give as their reason for carrying the catch on deck that, in the warmer water of southern California, fish piled deep in a lighter would be unfit for canning. The southern fishermen are handicapped by having to go farther to the fishing grounds, so that transporting the catch on the deck of the launch is easier than towing a lighter. Purse seiners claim that fish from the deep hold of their boats is uninjured for canning purposes and the cannery managers agree to the extent of willingly accepting purse seine fish.

The apparent success of the purse seine in competition with the round haul nets of San Pedro may be due to the real worth of the purse seine gear, but it is possible that success is due more to the respective fishermen than to the kind of gear used. Aside from the purse seiners, there are very few white men engaged in fishing sardines at San Pedro. Most of the round haul crews are Japanese with little knowledge of navigation and lacking in all-around fishing experience. This might possibly explain the partial failure of the round haul net, especially in foggy and rough weather. The relative merits of the

* Fish Bulletin No. 9 of "California Fish and Game Commission." Preliminary Investigation of the Purse Seine Industry of Southern California, by Tage Skogsborg. See page 9.

two types of gear could well be tried out at Monterey where the Italian lampara fishermen have had years of experience in catching sardines.

The purse seines now being used at San Pedro are not, of course, the same nets as used in the tuna fishery, but are smaller special nets made with small mesh for sardines. The present sardine purse nets are, roughly, 200 fathoms long by about 20 fathoms deep with a mesh size of 1 or 1½ inches. Webbing is usually tarred. The net is hauled by power winch, and dipping into the boat or brailing is usually by power hoist from a boom.

On the southeastern coast of the United States the purse seine is the standard gear for capturing the thousands of tons of menhaden that are caught for the purpose of reduction into fish meal and oil. The large capacity boats employed are efficient for handling fish intended for reduction, but such methods are poorly adapted to handling fish intended for canning. It is, however, possible to handle edible fish in large boats by the use of special methods, such as freezing or by chilling as is now being tried out in the menhaden industry. Another possibility is the so-called "unit system" in which fish are loaded into small units as boxes or baskets which can be stacked without crushing the fish. The added cost of such protective measures may more than offset the advantages of quantity transportation when applied to the present fishing conditions in the California sardine industry. Chilling methods may develop as a means of tiding over days of poor catch rather than as economy in transportation. At any rate purse seining seems to be a method adapted to quantity handling and long distance transportation, while sardine fishing in California is conducted at short distances from the canneries, so there is less advantage in each boat handling a large tonnage. Cheapness of operation will probably decide whether the round haul or the purse seine will finally win in the present competition at San Pedro. Whichever gear proves to be most successful, the battle will be watched with considerable interest.

Transmitted November, 1925, San Pedro, California.

BARGE FISHING ON THE SOUTHERN CALIFORNIA COAST.

By WM. C. VAN DEVENTER.

For many years the people who wished to fish in salt water had only three methods from which to choose. They had to have a boat, fish from a pier or fish from a beach. All of these methods had their drawbacks. The boat method was more or less limited to those who owned or were willing to pay the price of renting a boat. Fishing from piers or from the beach is rather slow as the fish are scattered and usually run very small in size. About five years ago Mr. A. B. Hohenshell of Long Beach conceived the idea of a fishing barge. This idea combined many very desirable features not found in the other methods of fishing. First, it is movable and can be towed to a location where fish may be caught. Second, it is large enough so that several hundred people can be accommodated. Such a large number of people using it makes it possible for the owner to charge a low rate for the privilege of fishing. Thus such a barge makes it possible for nearly everyone to go fishing and be insured of a good catch. Since the first introduction of fishing barges along this coast a great number have sprung

into existence, and today about twenty are found along the coast from Santa Barbara to San Diego.

When fishing was first started from a barge, equipment was old and dirty. The first one had few accommodations on it, for the owner did not wish to risk any more money on the venture than was necessary. The idea was new and the risk great. However, from the start the venture proved a success. Today this man has a barge, *Paproca V*, that is fitted with all the conveniences that are found on any boat. The barge is decked with concrete and has a capacity of two hundred and fifty people. A lunch room, lounge room, toilets, sleeping quarters for the convenience of the fishermen are provided, as well as quarters for a crew of five men. The barge is lighted by an electric system and water to wash the deck is furnished from a pumping outfit.

Transportation to and from the barge is provided by two boats that make hourly trips during the day and a trip at ten in the evening. The best fishing ground is located about four miles southeast of the Long Beach pier and these boats make the trip in about twenty-five minutes.

Fish are caught at every hour of the day. Mackerel are caught in the largest number, but at times bass, barracuda, and occasionally bonita schools surround the barge and are caught in large numbers. If one wishes to fish on the bottom and uses the proper gear, halibut and an occasional black sea bass may be caught. To insure a constant supply of mackerel, the barge is located in a favorable locality. Then to keep the mackerel around the barge, chum is constantly thrown out. This method of chumming insures a good supply of mackerel at all times. The mackerel gear is furnished free and consists of a long bamboo pole, with line, leader, sinker and hook attached. Mackerel or anchovies are used chiefly for bait. At night lights are hung over the sides of the barge and schools of small sardines and anchovies are attracted by the lights. These small fish in turn attract the mackerel which feed on such small fishes, and the mackerel are easily caught in large numbers. The best time for fishing is in the dark of the moon. Some people prefer night fishing to the day method, but I believe that the best fishing is at dawn or dusk.

Barge fishing is an established institution among southern California fishermen and is constantly gaining more popularity. This statement may be further emphasized when one learns that the *Paproca* in its five years existence as a fish barge has handled over one hundred thousand pay customers and a countless number of deadheads of which no record has been kept.

HUNTING WITH ANIMAL BLINDS IN MERCED COUNTY.

By J. E. NEWSOME.

In the early seventies a man named Charley Smith who formerly hunted for the market in the tules below Stockton, left there and came to Merced County, locating near the Santa Rita ranch where he intended to hunt for the market. In watching the cattle feeding around the ducks and geese he conceived the idea of training an animal to use as a blind to approach ducks and geese. He was very successful in his undertaking and killed thousands of game birds which were taken to



FIG. 9. Series of photographs showing a market hunter with an animal used as a blind; the approach, the shot, and the kill. More than a hundred birds were sometimes killed with the discharges from a large-bore gun before this type of slaughter was prohibited.

Merced and shipped to market. Miller and Lux hauled them to Merced free of charge to get rid of the birds as they were destroying a great quantity of feed. In those days they used large bore double-barrel guns as they did not have automatic and pump guns. Smith did not hunt many years. While there was an abundance of game the market was very poor and the express charges were high. Smith, no doubt, was the inventor of the live blind. Later he took his daughter Lillian Smith, who was a noted rifle shot, and traveled with Buffalo Bill's Wild West Show.

The next hunting with an animal blind was done by the Browning brothers. They hunted on the West Side in the Salt Slough country and had two large steers. A large negro worked one of them and they used large bore double-barrel guns. Their game had to be hauled to Merced as that was the nearest shipping point, there being no railroad on the west side. There were no bridges and the ferries were a long way apart. They had two scows, one on Salt Slough and one on the river near old Dover. The wagons were loaded on the scows and the horses swam the slough and river. Two wagons and teams were used and a load was taken to market every day as it required two days to make the trip. The largest shot they ever made was 184 ducks. They did not hunt very long as game was very cheap and it was quite an expense to get it to market.

There was not a great amount of hunting done for the market until the West Side railroad was built. Then there were several outfits in the fields all using large steers, the first being Knight & Jeffers, followed by John Reeves, James Knapp, Lambert, S. B. Roundtree, James Peterson, Ed Alders, Tom Rooney, Ed Lang, Saling and others. Lang used a single-barrel gun with a very large bore and all used steers as blinds. There were no horses used as blinds until after a law was passed to prohibit the use of a live animal blind. Then the horses came in style as they were too easily caught with a steer. When the old timers gave up the chase, the younger ones took it up with improved methods of slaughter. They used carts with three and four horses abreast and trained to run and automatic guns with extension magazines holding nine or eleven shells. Others had two automatics bolted together and the trigger connected so that they would both go at once, and with extension magazines holding nine shells each, making eighteen loads in all. After the law was passed prohibiting the use of guns with a larger bore than No. 10 there were a great many four-barrel guns used. Later the automatic came into use.

What became of our quail? In the years of 1876-77 and 78 Perry McDowell, Elisa Manning and S. B. Roundtree hunted quail for market in the West Side hills. In the season of 1878 the three men shipped 950 dozen, or 11,400 quail. In two days and a half, two of them killed 45 dozen, or 540 quail. They were shipped by stage to Gilroy, from there by train to San Francisco. There were other hunters who followed them and hunted quail until they were taken off the market.

CONDITIONS OF EXISTENCE OF FISH IN LAKE TAHOE AND TRIBUTARY STREAMS.

By G. A. COLEMAN, Biologist, California Fish and Game Commission.

The maintenance of a supply of game fish in Lake Tahoe, or any other lake, is not such a simple matter as most people imagine. Quite the contrary. Because of the great number of factors involved it is an intricate problem, requiring the most careful and extended observations and constant study.

We must first take into consideration the physical conditions, viz., the bottom, which is constantly changing, and next the temperature of the water, which, on account of the great depth, nearly sixteen hundred feet for an area covering nearly three-fourths of the lake, with a very steep decline and a very limited shallow shoreline, has a range of 20 degrees F. over the deeper part, and 20 degrees higher in the shallower parts near the shore where it reaches a temperature of 80 degrees F. during the summer. The temperature directly affects the density of the water, the summer sun warming the surface waters and causing them to become so much lighter than the deeper colder waters that the currents set up by the wind can no longer flow to the bottom. Hence a superficial circulation is set up and a distinct thermocline is established above which the water is warm (40-60 degrees F.) and constantly aerated, while below this the temperature is comparatively constant (39-39.9 degrees F.), but stagnant. This area of constant circulation is comparatively shallow, extending to a depth of about 100 meters while the area of constant temperature and no circulation occupies a depth of about 400 meters.

The amount of dissolved oxygen in the water upon which the fish are dependent for their supply is directly affected by these zones of circulation and stagnation, due to temperature. According to studies made by the United States Bureau of Fisheries during the month of July, 1913, the point of complete saturation (100 per cent) is reached at about 25 meters, from which point it declines rapidly to 100 meters where it reaches 89 per cent, below which it remains fairly constant, reaching 88.4 degrees at 501 meters (near the bottom). A little study will show that this agrees almost exactly with the temperature zones. Now these temperature zones are destroyed at the coming on of winter by the lowering of the surface temperature, and a complete circulation is set up during the winter and early spring.

Since all fish are extremely sensitive to changes of temperature (being affected by as small as .2 degrees F.) as well as by the supply of dissolved oxygen in the water, it is reasonable to account for the movements of the trout in the lake upon this basis.

All fish, but especially the Salmonidæ, which includes the salmon and the trout, migrate for two principal reasons, to obtain a proper food supply and for the purpose of securing suitable spawning ground. The first of these movements is daily and periodical according to the movements of their food, while the second is seasonal, occurring either in the fall or spring according to the habits of the fish.

With the native lake trout, which is primarily a deep water trout, the change of temperature gives them notice that spring is arriving, their first response being an immediate quest of food to relieve the

long fast which they have had in deep water, during which they have existed upon the accumulation of fat obtained during the previous season. The several species of minnows in the lake are their natural food, hence they immediately move to the haunts of the minnows which are the comparatively shallow waters along shore. They are ravenously hungry, and their condition at this time and at the spawning time immediately following will therefore largely depend upon the supply of minnows.

The minnows feed upon aquatic insects, both larvæ and adults, with a small proportion of plankton (microscopical plant and animal life) in the water. These in turn are dependent upon the algæ growing in the shallow waters along shore, except for certain minute algæ, crustacean and protozoan forms which live and breed in the open waters.

It is necessary also to have an adequate supply of the larger rooted aquatic plants in these shallow waters in order to furnish food and protection for the aquatic insects and protection for the young fish of whatever variety.

This aquatic vegetation depends in its turn upon a proper supply of nitrates in the water and soil. This is usually lacking in a mineral soil and can only be produced in a marly or vegetable soil by certain nitrogen-fixing bacteria which take the nitrogen from the air and water and work it over into a form suitable for absorption by the growing plant tissue. The process of decay is also constantly going on, giving off immense quantities of carbon dioxide which is absorbed and held in suspension by the water, where, if in any considerable quantities, it becomes a menace to the fish life. The growing plants take up this excess carbon dioxide, using it in starch building in connection with chlorophyll.

So we might go on almost indefinitely, because there is an almost endless connection and dependence between the plant and animal forms of this vast water community. With an idea of obtaining some clue to this intricate puzzle—game of life—which is far more complicated than any cross-word puzzle ever invented—biologists have made extensive and quantitative studies of the larger lakes throughout the world, as to the composition and abundance of the plankton (microscopical animal and plant life). This has been determined by a method of counting the organisms in an average sample of the water at different depths and expressed in numbers per cubic centimeters, or in cubic centimeters per cubic meters, or in my own studies, where possible, by weight in actual dried food material per cubic foot of water as grams per cubic foot, which may be figured as pounds in any given area according to conditions and depth. This to my mind is the only practical economic basis upon which we can base a reliable estimate of the number of young and mature fish that a lake will support. It gives us, too, the basis for comparison of one lake with another, while the composition of the plankton gives us the key to the problem of what species of fish will do best in any lake or stream. But of course all the existing conditions must be taken into consideration before an intelligent system of distribution can be adopted.

In consideration of the causes for the former abundant and now intermittent supply of the native lake trout (*Salmo henshawi*), we

must remember that vast geological changes have taken place within the life of this species. Many hundreds of years ago (comparatively recent as to geological time) there existed just across in Nevada a wonderful lake which is known to geologists as Lake Lahontan, covering an area equal to if not greater than Lake Superior, with which Lake Tahoe was connected by the Truckee River and Honey Lake. Eagle Lake and others were also directly connected. Evidence is abundant that the species which was named the Tahoe trout was at that time the characteristic trout of this great lake system. Now, however, lakes Pyramid and Winnemucca, which have become very much changed as to the composition of the water and physical conditions, are all that remain of this great lake. Formerly there was direct connection between Tahoe and this great lake through which the trout could pass freely. But you know what has happened within the past few years, all of which has had its effect upon the supply of lake trout and upon the other trout associated with it.

The silver trout, for example, is now very rare in Tahoe, while a related, if not identical, species is almost extinct in Pyramid and Winnemucca. The white fish too is apparently becoming scarce. In all this great array of changes it would not be possible to put one's finger on any one and say that it alone is the cause of the scarcity or disappearance of any one of these species of fish. They have all contributed. To say, therefore, that the trouble has been caused by the introduction of Mackinaw trout is utterly absurd. Probably they have contributed a small share, but the change would have occurred without them, and we have the Mackinaw which still furnishes a considerable amount of sport and is a very good fish.

Probably one great factor is the shifting and destruction of the food supply. Mother Nature usually maintains a perfect balance between her different species of plant and animal life, but occasionally she gives them a general shaking up, probably on the theory that they need it in order to develop new species and to put new life in the old. So she sends floods, drouths or other cataclysms which disturb the balance for a time until the different forms become adapted to the new conditions.

Man himself, this lord of creation of which we are so proud, is probably the greatest disturber of this balance of all the forces of nature. To satisfy necessities or imaginary necessities, for pleasure, or out of pure deviltry, he has created a list of wants which would make those of any ordinary animal, content with mere existence, pale into insignificance. In order to create for himself a suitable habitation he destroys entire forests. In order to clothe himself in fine raiment, he sacrifices herds of domestic animals. But these are not sufficient. He must, in pursuit of fur and feather, accomplish the destruction of vast numbers of wild animals and the complete extinction of not a few species. To satiate his ever increasing appetite and satisfy his changing tastes, vast herds and flocks of domestic animals and fowls are daily butchered and the products of garden, orchard and fields consumed. The immense supply of fish food in our vast oceans is neglected, and in order to satisfy this so-called sporting instinct the comparatively small numbers of edible fish in our mountain streams and lakes are ruthlessly destroyed. Surely it is true that we as a

nation, on account of our great abundance of all these things, have become the most careless and wasteful nation on the face of the earth. (For instance, on a hotel menu of 1850 there were indicated fifty kinds of meat, mostly game and fish.)

It is full time, therefore, that we call a halt, take account of stock and learn whither we are drifting. Otherwise, we are in sad danger of having handed out to us the same fate which we have so freely handed out to our fellow creatures. A few far-seeing individuals, realizing what this wanton destruction would mean, have been able by persistent and heroic effort, often at great personal sacrifice, to cause laws to be enacted for the protection of our wild life and to create game refuges in which our wild animals might have protection in the breeding season. If you do not believe that the wild animals and birds appreciate and recognize the establishment of these refuges, you have only to spend a few quiet weeks within the borders of a newly created one and watch them flock in from without the borders.

Finally it came to be recognized that with all these precautions the production could not keep pace with the annual destruction wrought by our ever-increasing population, both native and tourist, in their annual migrations to the mountains, without the help of artificial means of propagation. Hence the establishment of fish hatcheries to keep up a supply of fish in our lakes and streams and the establishment of game farms has become a necessity.

All this, however, is not enough. We must immediately take steps to secure the cooperation of the tourists, campers and sojourners at our resorts, in the proper use, *and not abuse* of the privileges they annually enjoy amidst the grandest scenery and greatest variety of climate of any part of the world. Protective laws and their enforcement are all right, perhaps, as a restraint, but they are only incidental. Control to be reasonable must be flexible. The trouble is we have too many laws which are not enforced and too little knowledge on the part of the general public as to the *why* of these laws, with a consequent disrespect and disregard for all law and law enforcement officials.

In my personal contact with all kinds of people, I have yet to find the individual whose innate love for nature would not in some way manifest itself, through his own knowledge obtained by first-hand observations, by a desire to obtain information on the habits of our wild creatures through reading, or listening to the observations of others. Children are the most eager for this knowledge, and thanks to our loyal and progressive teachers in our public schools, they are obtaining this information through daily lessons, in every grade from the kindergarten up, in nature studies supplemented by their own observations, at home and on the way to and from school. Along with this knowledge comes respect for and tender care of every living thing, and especially of the wild animal and plant life. Fish habits are taught through daily care of goldfish in the schoolroom by the children themselves, with an occasional visit to a large aquarium, supplemented by fishing trips mostly by the boys. The work of scout masters along this line is strongly to be commended. This work will have its effect upon the rising generation.

Meantime we have old sinners like ourselves to contend with. And this is truly a herculean task. We need for this work the hearty coop-

eration of every resort owner, proprietor or manager, all of the various United States government agencies, especially the forest service and reclamation service, all of the state departments, all of the corporate lumber and hydro power plant interests, our own legislature and governor, and the press. With this cooperation all along the line, we can in a few years accomplish much toward the restoration of our wild life. But such is the task that even with all these agencies working in perfect harmony, it will take years to restore anything like the original condition of things existing only a comparatively few years ago.



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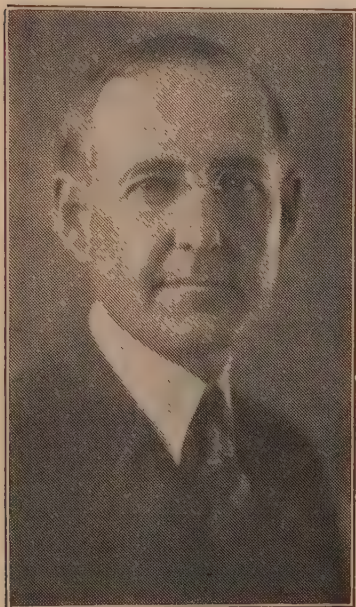
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All material for publication should be sent to H. C. Bryant, Museum of Vertebrate Zoology, Berkeley, Cal.

July 6, 1926.

"The best insurance that the state can take out in the interest of the sportsman and the outdoor lover generally is to see that facilities for study and investigation are enlarged upon. The lack of biological data is, without doubt, one of the greatest single factors in retarding development of a larger conservation program, involving better and wiser legislation and greater efficiency in production."



R. H. Clock

RALPH H. CLOCK, FISH AND GAME COMMISSIONER.

In December, 1925, Governor Richardson appointed Judge Ralph H. Clock of Long Beach as Fish and Game Commissioner to succeed Frank M. Newbert. Judge Clock for many years practiced law at Long Beach, California, was then appointed a superior judge for Los Angeles County. After a short period of service upon the bench he resigned to again resume his private practice.

Judge Clock is an outdoor man, loves the open and is intensely interested in fish and game. He is an ardent angler and an enthusiastic sportsman. In fact, he is exceptionally well qualified to have a part in determining conservation policies in this state.

FISH AND GAME COMMISSION REORGANIZED.

At a meeting of the State Board of Fish and Game Commissioners held in San Francisco on January 18th, the resignations of Mr. George Neale, executive officer, and of Mr. Charles Gilmore, assistant executive officer and attorney, were accepted. Mr. B. D. Marx Greene, who for nearly a year has handled the legal work for the Commercial Fisheries Department, was selected as executive officer. Mr. J. S. Hunter, in charge of the San Francisco office, was appointed head of a new law enforcement department, and he will have entire charge of all of the patrol force in the state. This last appointment is the beginning of a plan to center the activities of the commission in various departments headed by competent executives.

Far greater efficiency in the management of fish and game affairs is to be expected from the reorganization planned by the commission newly appointed by Governor Richardson.

THE NEW EXECUTIVE OFFICER.

The new executive officer, Mr. B. D. Marx Greene, is a native Californian, born in San Francisco. He has been a practicing attorney in California for the past eighteen years, part of which time he served as city attorney of Berkeley, and was for twelve years city attorney of Pittsburg and Antioch in Contra Costa County. For several years, commencing in 1918, he specialized in rate proceedings before the California Railroad Commission, being retained by over fifty cities and counties in northern California to act as their counsel in electric, gas and transportation cases. In August, 1924, he was retained by the Fish and Game Commission as special counsel to handle the litigation arising

from the commission's effort to prevent the overuse of sardines for the manufacture of fertilizer. This subject finally became of such supreme importance to the commission and the people at large that his employment was made permanent as attorney for the Commercial Fisheries Department of the commission to handle the sardine litigation and other matters pertaining to that department. The final result of this work for the commission has resulted in the saving of the sardine crop for edible purposes and has completely blocked the attempt of certain

departments and putting the work of each upon an efficient and workable basis. Mr. Greene stands willing both to receive and accept suggestions and advice, and his future policy in handling the commission will be that of maintaining close contact not only with the men associated with him in the work of the commission, but with the general public. The Bureau of Biological Survey at Washington found this method of having a business executive to handle the routine overhead work a splendid one, and it is expected that the present plan will work out to the utmost satisfaction of all concerned. The department heads feel fully confident that the new executive officer will give the commission the best administration yet attained.

COMMISSION'S WORK REORGANIZED.

The work of conserving the fish and game resources of California is a great undertaking and the numerous employees of the commission must work together if real accomplishments are to be attained. Just as the efficient administration of any large corporation is dependent upon a selected group of department heads upon whom responsibility is fixed, so in the work of the Fish and Game Commission similar departmental organization has become necessary. In fulfillment of the promise to give conservation work a thoroughly businesslike administration, the work of the commission is to be accomplished through certain departments and bureaus. The main departments will be Administration, Patrol, Fishculture, Ladders and Screens, and Commercial Fisheries. Less important branches of the work will be designated as the bureaus of Accounts, Education and Research, Publicity, and Game Farms.

The executive officer will hold cabinet meetings attended by each department head and by such bureau heads as are needed for matters under discussion. At these meetings matters of policy and projected plans will be discussed. The executive officer will parcel out the actual work to the various departments and bureaus and will devote his time to matters of business management and policy. He is to supervise all the work of the organization, and each department and bureau head will report in writing monthly so that he may have full knowledge regarding activities and progress. District offices at Sacramento and Los Angeles will be subsidiary rather than independent.

Some idea of the working out of the



B. D. Marx Greene, Executive Officer.

interests to commercialize this food fish for nonedible purposes.

On January 18th of the present year, Mr. Greene was chosen executive officer by the commission for the express purpose of reorganizing the commission and putting it upon a business basis. Mr. Greene was not chosen on account of intimate knowledge of fish or game, but to act as a business executive. Consequently, he plans to depend upon responsible department heads for the technical work of the commission and his time will be devoted mostly to coordinating these

plan of organization may be obtained by the following skeleton outline of the functions of the various departments.

COMMISSIONERS.

I. Zellerbach, president, M. J. Connell, R. H. Clock.

The three Fish and Game Commissioners will determine upon general policy and organization. Departmental heads will be present at all meetings of the commission and will be consulted whenever policy concerning their department is determined. Full publicity will be given the actual policies set at these meetings.

EXECUTIVE OFFICER.

B. D. Marx Greene, executive officer and attorney.

The executive officer will be in reality the general manager of the organization. To him will fall the duty of coordinating the work of the various departments, passing judgment as to the necessity and feasibility of projects, determining precedents of projects and preparing the budget. Supervision of all legal work of the commission will also fall to his hands. Much of the routine answering of letters will be parceled out to various departments.

DEPARTMENT OF PATROL.

J. S. Hunter, chief of patrol.

Demand for a more unified patrol service has been met by the organization of a Department of Patrol with J. S. Hunter in charge. As the result of knowledge of law enforcement and long years of service, Mr. Hunter is eminently fitted for this position. The Department of Patrol will have complete charge of law enforcement work in the state with the exception of the fisheries patrol off the coast of southern California. The state is to be divided into a dozen or more districts and a captain of deputies will be appointed to have charge of the men in each district. Individual deputies will report directly to the captain of deputies and through him to the chief of patrol. In addition there will be a group of unattached men at the central office who will be held in readiness to be sent to any district in the state where assistance is needed. It is expected that under this system the work of the patrol service will be unified and that each man will know his duty and act accordingly.

DEPARTMENT OF FISHCULTURE, SCREENS AND LADDERS.

W. H. Shebley, in charge.

As in the past the duties of this department will be the establishment of hatcheries, the rearing of food and game fishes and the stocking of the waters of the state with the fish reared and the supervision of screen and ladder installation.

DEPARTMENT OF COMMERCIAL FISHERIES.

N. B. Scofield, in charge.

As in the past the Department of Commercial Fisheries will be charged with the regulation and control of commercial fishermen and cannerymen, the compilation of statistics relative to the catch of fish and all matters pertaining to the conservation of the fish and fisheries along the California coast. There will be more rigid control of matters related to food fishes in the making of oil and fertilizer and the State Fisheries Laboratory will continue to secure data as to the life history and habits of the more important food fishes.

BUREAU OF ACCOUNTS.

H. R. Dunbar, assistant executive officer, in charge.

Mr. H. R. Dunbar, located at Sacramento, has been appointed assistant executive officer in charge of accounts. Mr. Dunbar will be entirely responsible for all the records and accounts of the commission. By means of a revolving fund it will be possible to pay expenses very quickly after they have been submitted.

BUREAU OF EDUCATION AND RESEARCH.

H. C. Bryant, in charge.

It will be the function of this bureau to continue educational work in the schools, to issue educational bulletins, furnish lectures, lend motion pictures and lantern slides and edit the quarterly magazine CALIFORNIA FISH AND GAME together with all other publications. It will also be the duty of this bureau to keep files containing data relative to the life history and habits of all game species and to supervise game research work of the commission.

BUREAU OF PUBLICITY.

Rolin G. Watkins, in charge.

For some time the Fish and Game Commission has needed wider publicity as to accomplishments and plans. The work of furnishing the newspapers with full information relative to activities of the commission will fall upon this bureau.

For the present this bureau will also have charge of pollution.

BUREAU OF GAME FARMS.

August Bade, in charge.

As provided by law this bureau will have in charge the importation, propagation and distribution of game birds. All matters relative to the new state game farm at Yountville will naturally fall within the sphere of this bureau.

RESULTS EXPECTED.

1. Each department and bureau head will know his place and function in the organization.

2. Each department and bureau will be furnished a budget and will know what new work can be undertaken.

3. Methods of procedure will be determined largely by the men concerned in the actual undertaking.

4. There will be opportunity for a working plan for future years.

5. Coordination of the work of the various departments and centralization of authority will greatly increase efficiency and assure better achievement.

SERVICE BULLETIN WILL BE ISSUED.

The employees of the Fish and Game Commission have become so numerous and they are so widely scattered that it has become necessary that a closer touch with a head office be secured through the issuance of a service bulletin. It is hoped by this means to unify the working force of the commission. The bulletin will contain information useful in building up a more efficient service. The first number, issued on January 30, contained articles on the new commissioners, the new executive officer and an outline of the departmental organization. Stress was laid on the reorganization of the patrol service as a distinct department with J. S. Hunter in charge. It is planned to issue this service bulletin regularly every month. The material will not be for publication and the bulletin will go to employees only.

COMMISSION'S WORK PRAISED.

In the April issue of *Sunset Magazine* (out March 15th), designated as the Fishing Number, an article, "Gasoline and Trout," by Walter V. Woehlke, calls attention to the good work now being done by the California State Fish and Game Commission to increase the trout population in our mountain streams and to prevent the yearly catch of sardines

in California waters from being turned into fertilizer instead of food products. Credit for the recent marked improvement in these matters is given by the writer to the present vigorous administration of the commission under the leadership of Mr. Zellerbach.

The issue contains a number of other articles of special interest to fishermen. Chief among them is one by the noted author and sportsman, Zane Grey, entitled "The Log of the *Gladiator*." It is a vivid diary account of this famous writer's swordfishing experiences last summer off Catalina Island with a party of enthusiastic deep-sea anglers. "Mostly About Trout," as told by Tod Powell to D. R. Lane, urges sportsmen to make their trout fishing more of a fine art, and advocates more widespread use of the barbless hook, so that trout which have been caught may be returned to the stream without serious injury to them. "When you go trout fishing, fish for sport, and not for fish," is Tod Powell's argument.

IN MEMORIAM.

Henry J. Abels.

Relatives, friends and associates of Henry J. Abels, veteran employee of the Fish and Game Commission, were shocked to learn of his sudden passing on August 21, 1925. He was stricken with an attack of apoplexy while on duty in the Santa Barbara Mountains, about twenty-eight miles east of Santa Maria.

Henry J. Abels was born July 26, 1876, at San Luis Obispo, California, and was six years old when his parents settled in Santa Maria. In 1894, he was appointed United States Forest Ranger for the Santa Barbara National Forest, being one of the first rangers appointed in California. In 1899 he was appointed game warden for Santa Barbara County, which office he held eight years. He was appointed an Assistant Fish and Game Commissioner in 1906. In 1917, by unanimous vote of the board of supervisors, Mr. Abels was appointed county game warden of Santa Barbara County.

Deceased was past master of Hesperian Lodge No. 264, F. & A. M., member of Omar Commandery No. 30 K. T.; Al Malaikah Temple, A. A. O. N. M. S. of Los Angeles, and Santa Maria Lodge No. 90 K. of P.

Known for his courtesy, tact and fairness in the discharge of his duties, Mr. Abels made a host of friends. An enthusiastic worker, he was continually engaged in espousing the principles of

conservation. His untimely passing brought to an end an enviable record of nineteen years in state service.

Mr. Abels is survived by his wife, a son and a daughter.

Bernard Luttrell.

Bernard Luttrell, 27 years of age, who had for several months been a deputy of the Fish and Game Commission in Siskiyou County, was accidentally shot while on a hunting expedition on Moffatt Creek, October 12, 1925.

Bernard Luttrell and his father, Benjamin Luttrell, his uncle, Peter H. Luttrell, and his three brothers, Superior Judge Charles J. Luttrell of Yreka, Dr. Luttrell of San Francisco and George E. Luttrell, teacher at Tennant, California, had met according to custom for an annual hunting expedition on Moffatt Creek, their favorite hunting ground.

Bernard Luttrell was in a tree to get a better view of deer that might be stalked by his companions in the brush. On descending the tree the trigger of his gun caught on a twig, the weapon was discharged and one side of his head blown off.

He leaves a widow and three small children. During his service with the commission he proved himself to be a fearless and conscientious warden. Those who worked with him gave high praise to his ability.

DUCKS DIE FROM ALKALI POISONING.

Early in the fall reports came from the Tule Lake district of northeastern California and from the vicinity of Gridley in the Sacramento Valley to the effect that thousands of birds were to be found dead in these localities. Several investigations were started by federal and state officials. Judging by examinations made at the State University, statements to the effect that cholera was responsible are not tenable. Post mortem examinations of a number of ducks from the Sacramento Valley showed symptoms of alkali poisoning. The digestive tract was empty but filled with mucus, and there was a tendency for the inner lining to peel off. Otherwise the birds appeared to be in splendid condition. All bacterial tests proved negative. As has been true in the past, the disease disappeared after the first rain.

HATCHERY WATER SUPPLY.

In hatchery operations the purity and temperature of the water supply are all important. As a rule difficulty is to be

found in the high temperature of the water in late summer, which gives trouble in keeping the fish in a healthy condition. In the case of one hatchery in the state it is the coldness of the water which has given difficulty. The water at the Tahoe Hatchery comes from a very cold spring, the water having a temperature of 38 degrees. Water at this temperature retards the growth of fish so that they are practically sixty days in development behind fish reared in warmer water. The water from this spring is also low in oxygen content. Plans are now being made to improve conditions by aerating and raising the temperature of the water about ten degrees by running it through a pond system and aerating fountain before it enters the hatchery. With this accomplished, fishcultural operations at this hatchery can be speeded up and greater efficiency gained.

GAME LAWS BECOME POPULAR.

Chas. E. Hughes recently made this statement: "The surest way to make government and law unpopular is to permit it to be both ineffective and annoying." Apply this to fish and game laws and we perhaps see the reason for their unpopularity twenty years ago. As the force of wardens has become more effective and their methods less annoying, fish and game laws have come into favor. No one thing has so greatly shown the change in attitude as the willingness on the part of judges to give maximum fines. In spite of present attainment there is still much to gain. With increasing settlement of the country and increasing number of foreigners to poach upon game resources, there must be more rigid enforcement. Too many people believe that law enforcement is wholly up to the game warden, whereas in reality the attitude of mind of each individual counts.

Help popularize fish and game laws!

NEW PLANS FOR GAME REFUGE BILL.

During the meeting of the Western Association of Fish and Game Commissioners held at Denver last August, representatives of five great conservation societies joined in drawing up a new plan for securing an adequate set of game refuges. Misunderstandings were cleaned up and a new start made when, by resolution, recommendations of D. H. Madsen, Fish and Game Commissioner of Utah, the chief opponent of the game refuge public shooting grounds bill which has failed to pass in two sessions of congress, were adopted. The resolution was as follows:

Resolved, That the action of the officers of the International Association of Game, Fish and Conservation Commissioners, in conference with the officers of the Western Association of State Game Commissioners, in accepting, in principle, the amendments to the Federal Game Refuge Bill offered by Commissioner D. H. Madsen of Utah, is hereby approved by this convention;

And be it further resolved, That the Western Association of State Game Commissioners, the International Association of Game, Fish and Conservation Commissioners, the American Game Protective Association, the National Association of Audubon Societies and the Izaak Walton League, are requested each to appoint one member of a committee of five for the preparation and the submission to congress of the bill in accordance with this resolution.

This committee was immediately appointed as follows: William C. Adams, Massachusetts, for the International Association of Game, Fish and Conservation Commissioners; David H. Madsen, Utah, for the Western Association of Game Commissioners; John B. Burnham, New York, for the American Game Protective Association; George H. Selover, Minnesota, for the Izaak Walton League of America; Dr. T. Gilbert Pearson, New York, for the National Association of Audubon Societies.

It was hoped that this getting together of advocates and opponents of the former game refuge public shooting grounds bill would eliminate the old snags of "new federal tax," "more federal bureaus" and "more federal policing." However, this was not to be. The proposed bill which was to substitute for the federal license fee a federal sales tax on sporting arms and ammunition as a means of providing funds for the purchase of refuges and maintenance did not meet with the approval of the administration. Consequently the committee voted unanimously for discharge because of the impossibility of accomplishing the object for which they were appointed.

A duplicate of last year's bill has been introduced in both senate and house and friends of the measure are asking opponents to forget differences, submerge prejudices and unite in support of the measure.

THE GAME WARDEN NEEDS SUPPORT, NOT CRITICISM.

At the meeting of the Associated Sportsmen's Clubs of California held on December 10th, the game warden was both abused and commended. When the only warden present was called upon he feelingly called attention to the habit of those reporting game violations of reporting the matter several weeks after the

offense happened, of giving little real dependable evidence on which the warden might work, and of seldom being willing to appear in court as a witness. Certainly we are expecting too much of a warden if we expect him to catch single handed all violators in a district often comprising two or more counties.

One great step forward has been taken in the helpful attitude of judges. The next necessary thing is to secure the cooperation of all citizens in bringing to justice the violator of the game law. We are now sure that the courts will do their share in making the violator think twice before he acts.

PLAN BIOLOGICAL SURVEY OF LAKE TAHOE.

Mr. George A. Coleman, biologist for the Fishcultural Department, has made several important surveys in recent months. On completion of work at Clear Lake where a complete biological survey of the food available for fish in this lake was made, attention was turned to the Lassen National Park area. Encouraging reports were obtained relative to the plants of steelhead in Juniper and other lakes, and if recommendations relative to introducing a food supply in some of the lakes are carried out, fish in these mountain lakes will become more numerous.

Plans are now being made for a complete biological survey of Lake Tahoe. In addition to an effort to find out exactly the natural food supply available for fish, an attempt will be made to determine the depth at which the various kinds of fish found in the lake feed. Special copper line equipment will be utilized to make these determinations.

Another important problem concerns the white fish of the Truckee basin which has been greatly depleted. Efforts will be made to artificially propagate this fish. A number of hatcheries in the middle west specialize on the propagation of white fish and there is no reason why California should not be active in similar work.

THE ANNUAL KILL OF MULE DEER IN MODOC COUNTY.

The concentrated hunting which takes place in the lava beds in Modoc County is shown by the report of mule deer killed during the season of 1925 as reported by the forest service. The number actually checked within the Modoc National Forest shows 510. The average number checked in the past three years is 323. The season of 1924, on account of the closing of the forest, was a very light year, which brought down the total.

THE WORLD'S RECORD BROAD-BILLED SWORDFISH.

On July 12, 1925, Mr. F. A. Galespie of Beverly Hills, an executive member of the Tuna Club, took a broadbilled swordfish (*Xiphias gladius*) weighing 571 pounds. This proved to be the world's record. Equipment consisted of a 24 thread line with a breaking strain of 63 pounds. The fish took fifty-five minutes to land. Mr. Galespie was out for tuna when a big broadbilled swordfish was found loafing on the surface. Several times bait was thrown to within a few feet of the fish without result, but finally the swordfish became interested and was hooked. The previous record for this fish was 528 pounds, a record held by Mr. Harry J. Mallen.

VIOLATOR HEAVILY FINED.

As an evidence of his determination to aid the Fish and Game Commission in the enforcement of the fish and game laws, Judge Ernest Windle of Avalon, Santa Catalina Island, recently imposed a fine of \$400 upon a violator, together with ninety days suspended sentence. Peter Zar, an Austrian fishing out of San Pedro, was the defendant in the case and was brought into Judge Windle's court by fish and game deputies Walter Engelke and N. C. Kunkle for a violation of the law which prohibits the use or possession of a purse seine in fish and game district No. 20.

ARE WE COMING TO CLOSED SEASONS ON TROUT?

Overfishing in some sections of the state is causing the angler anxiety. Depleted streams in other states are satisfactorily handled when the Game Commission has plenary powers and is able to close them. In California it takes an act of the legislature to close a stream to fishing.

A recent report from Michigan is to the effect that following a survey of the trout streams of that state by several experts, the game commissioner advocates the closing of all trout streams of the state for a period of five years.

The fish hog may well ponder over this recommendation. If care is taken and if a fisherman thinks about the other fellow who may want his share from that stream, there is real hope that no such policy will be adopted in this state. If, however, each angler selfishly gets all he can continually, our streams are bound to be depleted and drastic measures will become necessary.

PELICANS AND FISH.

Man is forever condemning some bird or some animal for its depredations. Sometimes these accusations have a basis in fact, and at other times they are chance judgments. In view of the fact that sentiment against the pelican and cormorant secured emendation of the law and placed these two birds on the "black list" the following summary of investigations by E. Raymond Hall under the direction of the Bureau of Biological Survey during the summer of 1924 are pertinent. In an article entitled "Pelicans vs. Fishes in Pyramid Lake" published in *The Condor*, Vol. 27, pages 147-160, the following summary appears:

The white pelican is not detrimental, either directly or indirectly to the fishing industry of the Pyramid Lake region. However, local sentiment is in the main antagonistic toward this bird, because it is believed to eat large numbers of trout. With the increasing popularity of Pyramid Lake as a summer resort, and with the present lack of protection accorded this bird, the species will, in no great length of time, cease to breed there.

It is true that trout are decreasing in numbers, both in the lakes and in the rivers of the region. This is due to a multiplicity of causes. Most important of these is the depletion of water in the Truckee River. Formerly, between October and June, the common trout of Pyramid and Winnemucca lakes, *Salmo henshawi*, ascended the Truckee River to spawn. Fish culturists say that this, like some other species of trout, requires running water to insure fertilization of the eggs, hence it can not reproduce in the lakes. Insufficient water in the Truckee River at the critical season not only prevents most of the fish from reaching their spawning grounds, but results in the death of those fish that do get into the river. On May 17, dozens of *Salmo henshawi*, weighing from 5 to 18 pounds each, were found dead in pools of the Truckee River just below the Indian Reservation Dam. Conditions of this kind have existed in previous years at other dams along the river (see Snyder, 1917, p. 42). The fish could not pass the Indian Reservation Dam because there was no water to flow through the fish ladder. Later in the year fish died along the river in great numbers because of the stagnant condition of what water there was. The stench from decaying fish is said to have become so offensive that, near Reno, men were employed to bury them. This lack of water is the result of dry seasons, construction of the Derby Dam (which is said to divert the water that naturally flowed down the Truckee River into the Carson River), and the general withdrawal of water for irrigation purposes.

Only one of the Nevada irrigation ditches taking water out of the Truckee

River has a screen, according to persons familiar with the situation; and this screen was stated to be inadequate. None of the ditches that I examined had a screen. A heavy toll of trout is taken when the fry wander out into the smaller ditches and into the fields. The Derby Dam, the largest of the several dams in the river, has no adequate fish ladder by which the fish may ascend to their former spawning grounds.

Sewage from the several cities and refuse from sawmills and paper mills are emptied directly into the river, and are unquestionably detrimental to the fish life, especially at periods of low water. Some of this refuse is said to accumulate in pools and kill the spawn of the trout.

The critical factor in the welfare of the trout of Pyramid and Winnemucca lakes is the condition of the Truckee River, which, for the reasons stated above, no longer permits of the fish ascending to their spawning grounds. Furthermore, the river is no longer supplying the normal amount of water to the two lakes. Indeed, the level of these lakes goes down several feet each year. The development of other irrigation projects along the Truckee River now under consideration, including the construction of reservoirs, will no doubt further decrease the amount of water reaching Pyramid and Winnemucca lakes.

The white pelican, then, is probably in no way responsible for the decrease which is so apparent in the number of trout. The causes of this decrease are man-made, and those which are believed to be the most salient have just been pointed out.

CALIFORNIA LEADS IN FISHERIES.

The statistics for 1922, compared with those available for former years, strikingly reveal the changes taking place in the Pacific coast fisheries. With the development during the last decade of the tuna and sardine fisheries, California has forged ahead to the leading place among the Pacific coast states. The number of persons engaged in fisheries increased from 4129 in 1908 to 8452 in 1915 and 9173 in 1922. The investment increased from \$1,659,000 in 1908 to \$5,824,263 in 1915 and to \$13,047,414 in 1922. The value of her products increased from \$1,970,000 in 1908 to \$2,506,702 in 1915 and to \$6,773,981 in 1922.—Annual Report of the Commissioner of Fisheries, year ending June 30, 1925.

MOUNTAIN SHEEP INTRODUCED.

W. R. Hearst is making some interesting experiments with big game animals on his ranch at San Simeon, California. Sizeable herds of buffalo, elk, antelope, deer, reindeer and wild goats are to be found on 450 acres of fenced land. The

most recent introduction is of eighteen Rocky Mountain bighorns secured in Alberta Park, Canada. Mr. Hearst now owns the largest collection of big game animals in the state, and the results of his experiments will doubtless determine to what extent the Pacific Coast Sportsmen's Club and similar clubs will pursue their intention of establishing large game preserves.

FISHING AT CATALINA.

Angling near the Channel Islands continues to attract anglers from far and near. That large fish are available and make the journey worth while is evidenced by the annual awards of the Tuna Club. For the season 1924 the largest fish were as follows: tuna, heavy tackle, 149½ pounds; tuna, light tackle, 117½ pounds; marlin swordfish, heavy tackle, 345 pounds; marlin swordfish, light tackle, 191 pounds; broadbill swordfish, heavy tackle, 528 pounds.

J. W. Jump secured the Brewster medal for the largest tuna. It weighed 191 pounds.

FUR CONSERVATION ESSENTIAL.

The perpetuation of fur-bearing animals in the wild is as much a matter for public concern as the conservation of any other natural resource. Although administration of forests, fish and game may rest with either individual states or the federal government, the maintenance of the fur supply is primarily the business of the states. The United States Department of Agriculture is charged with the enforcement of the Federal Lacey Act, a law which regulates interstate commerce in wild animals and supplements state legislation in efforts for the conservation of fur animals. In administering the law the attitude of the department is one of cooperation and coordination and not federal control.—U. S. D. A. Farmers Bull. 1469.

BLACK-TAILED DEER SUCCESS- FULLY REARED.

On Decoration Day, four years ago, our neighbors out on a picnic found a female black-tailed fawn just born and not even able to stand up. Believing it deserted, they brought her back to us that evening and we fed her warmed cow's milk from a bottle and nipple. As this food made the fawn sick, we tried boiled milk and water in equal parts. Under this diet she quickly recovered and soon became a wonderful pet, following us everywhere like a dog and crying "ma-ma" like a baby to let us

know she was hungry. We fed her about every two hours during the day and twice during the night. We named her Yvonne.

The following November, a young man who was leaving town and who was the owner of a five-year-old buck asked the Fish and Game Commission permission to transfer him to us. Dick was a nice

at the same places, asking for her milk the same way.

Two years ago in August, Yvonne had her first baby, Maggie, and a week after, we were very much surprised when Pierrette, only fifteen months old, become mother of a beautiful little buck, Jiggs. Very few people know that it takes two



FIG. 10. Complete series of antlers from a nine year old black-tailed deer. Here is evidence that the number of points does not accurately indicate age. Photograph by R. O. Rampont, Ukiah, California.

three pointer, of ordinary size, quite gentle.

The next year after in May, another female fawn was found on the Orrs Spring road by the body of her dead mother and nearly starved. We raised Pierrette by the same method that we did Yvonne. She had exactly the same habits, sleeping

hundred days for a doe to have a fawn.

Last year in July both had twins and this last June, Yvonne, Pierrette and Maggie (the first deer born in our place) gave us six more fawns.

In less than four years, starting with two female fawns and a buck we found ourselves possessing a herd of fifteen deer.

Although we have just a block of ground in the center of the city of Ukiah, yet it is an ideal place for them, just like a forest.

All the deer are in fine shape all year long. Every morning each one gets about a quart of rolled barley. During the spring and summer we feed them grass, alfalfa, kale, any kind of vegetables, especially potato peelings, brush (poison oak, chamiso, madrone, oak limbs, fruit tree leaves.) Later we give them grape suckers and ripe fruits, and in the winter, dry alfalfa and acorns. They have rock salt all the time. They

OPEN SEASONS FOR FUR BEARERS.

Ill-advised open seasons are a natural result of lack of sufficient information regarding the life habits of fur animals on the part of farmers, trappers, members of the fur trade, legislative committees and even of conservationists. The seasons established by a number of states do little to prevent the decrease of fur bearers in certain sections. A defect frequently noted in present fur laws is that the open season provided is so long that it permits trapping before pelts are prime in fall and after breeding is in progress in spring.



FIG. 11. A black-tailed deer reared by R. O. Rampont, Ukiah, California. Photograph by R. O. Rampont.

are very fond of bread, candies, peanuts, cigarettes and chewing tobacco.

Our bucks lose their horns about Washington's birthday. The accompanying picture shows Dick's entire set of horns when nine years old. (See Fig. 10.) You will note that for five years he was a three pointer, the last two years a four pointer. Jiggs, only two years old, is a three pointer. We are convinced that horns do not always indicate the age of a deer.

We have demonstrated what can be done in deer farming when proper care and protection is given. Judging from our experience, it should be possible to increase the game in any part of the United States.—R. O. Rampont, Ukiah, Cal.

Fur is in prime condition for harvesting at one brief season only. An open season of more than three months duration is not justifiable anywhere in the United States if the prime condition of peltries and the economic status of fur animals were taken into consideration. That the seasons are not wisely determined is emphasized by the fact that far too many unprofitable pelts are coming to the raw-fur markets every year. A keener appreciation of conditions revealed by studies of the habits, breeding seasons and periods of prime fur on the part of those concerned with the framing of laws and regulations governing trapping would result in increased pelts of superior quality reaching the markets, thus allowing greater financial rewards to trappers and

at the same time augmenting the numbers of breeders in the covers.

A few generations ago furs of many kinds were commonly taken in all sections of the country, but now, with the depletion or extinction over great areas of certain of the more prized species, the most valuable fur bearers, from the viewpoint of financial returns from the annual catch, are muskrats, skunks, raccoons and opossums.—U. S. D. A. Farmers Bull. 1469.

AN ANTI-POLLUTION PLATFORM.

Congressman Clarence MacGregor in an address before the New York Waterways Association quoted and endorsed *The Outlook's* anti-pollution platform:

The nation has an inalienable right to clean waters.

Disposition of the waste of industry is a proper charge against industry, and against industry alone.

No corporations and no communities have any more right to pollute the waters with their waste than have citizens to dump refuse on their neighbors' property.

He is not an alarmist when he says:

Civilization must not be allowed to destroy itself. We must not be blind to the fact that the destruction of natural resources is suicide. Our civilization is too ruthless. We dry up our streams by failing to protect our forests. We kill the bird life by taking away their dwelling places and leave the fields open for the pests that destroy our agriculture. We kill off our fish by destroying their home. We create cesspools from which to extract our drinking water. We fill our graveyards with the victims of our barbarity. We are more than foolish. We are absolutely stupid.—*The Outlook*, Oct. 28, 1925.

CAUSES OF FUR DEPLETION.

The value of the annual catch of fur-bearing mammals in the United States 25 years ago it was roughly estimated at \$25,000,000. Today it is estimated at \$70,000,000. If the supply of fur animals had been maintained in suitable areas the income to trappers would have greatly exceeded present-day values. Much of the actual loss on furs taken could be eliminated by confining trapping to periods of prime fur, exercising care to remove pelts properly and to cure them thoroughly before shipment to raw-fur receiving houses.

Trapping too early or too late and failing to care for furs properly have resulted in a loss of approximately 20 per cent of the annual catch. Receiving houses are responsible for much of this waste by sending out early price lists containing quotations on prime furs not obtainable at the time—a formal invita-

tion to the trapper to begin operations at once. By such action not only does the receiving house accept unprime pelts but the trapper gets a smaller return than he would have received by starting operations during the season of prime fur. All fur bearers increase rapidly under reasonable protection, and if the unprime animals now killed every year were left for breeding stock this probably would not decrease the annual catch more than 5 per cent, and within five years the supply of wild fur animals would without doubt be increased 50 per cent.—U. S. D. A. Farmers Bull. 1469.

That many trappers have been permitted to ply their trade out of season and to gather pelts to the point of extermination of the fur bearers over large areas is only one cause for our present shortage. Serious responsibility rests also on fur buyers and their agents, who, by accepting at a price all skins offered, thus marketing illegal pelts, tempt trappers to make a thorough clean-up all along their trap lines. Another factor in the scarcity of fur animals is found in the greatly reduced fur-producing areas. The encroachment of civilization naturally reduces the extent of such areas, but more thought and attention can well be given to the indiscriminate drainage of swamps and to the unnecessary cutting and destroying of forests and cover.

Taking an unprime pelt is a deliberate waste of one of nature's most valuable and beautiful gifts, and not until trappers and raw-fur men learn to look upon it as such will the best use of our valuable resources in fur be realized.—U. S. D. A. Farmers Bull. 1469.

ARIZONA ESCAPES GAME LAW MUDDLE.

Last fall Arizona attempted to recodify its game laws by means of referendum. The move was sponsored by the State Game Protective Association and the state game warden. It was intended to submit the matter to the voters at the general election in 1926, but the legislature at the last meeting ordered it submitted this year. As a consequence passage of the measure would have closed all legal hunting and fishing in the state, abolished the state game department, fish propagation work and all other activities until the legislature met and new laws were enacted. As a consequence it was necessary to first put on a campaign asking sportsmen to kill the bill, and later by means of an injunction to order the Game Law Repeal Bill off the referendum ballot. Through the last method the situation was saved,

"THE CODE OF AN ANGLER."

1. He holds that a good fisherman not only can catch fish but is one who rigidly conserves angling as a sport.

2. He realizes that fish must have homes in which to live, therefore he sees to it that good forests and waters are made available and kept available for abundant fish life.

3. He knows well the enemies of the fish—the water snake, the hawk, the otter—and he takes of his time and money to rid fish life of these menaces.

4. He loathes that human "fish-hog" who ruthlessly wastes and destroys, and he vigilantly brings to bay these robbers of our fish.

5. He is tortured by that ghastly nightmare, pollution of waters, and he fights everlastingly to keep clear waters clear, and to redeem foul waters to purity.

6. He is a student of fish life and habits. Thus he knows that both the size and number of fish depend directly upon the abundance of the food supply. Therefore he conserves bait life, and water vegetation.—*Forest and Stream*, April 1925, p. 216.

THE REAL SPORTSMAN AND THE BAG LIMIT.

The days when admiration went to the man who boasted of his big killings and of exceeding the bag limit are fast passing. Sentiment now favors the sportsman who has a "gentleman's limit."

Many a sportsman who in days past has been accustomed to getting the limit, now believes in fixing his own bag limit. Furthermore he is willing to express his ideas in the hope that others will see the wisdom of taking only a fair share.

In California, too many sportsmen still kill more game than they are able to use. Game is vanishing as civilization advances, and a love for and desire to perpetuate the wild things of nature as well as a desire for more fish and game should induce the real sportsman to fix his own bag limit, regardless of the sneers of some of his fellows, whose selfish practices will turn from them the very favor which they seek—the favor of public opinion.—B. E. P.

WARDEN POSTS SIGNS.

Game Warden W. B. Sellmer of Marin County posts the following warning as he patrols his county:

GAME WARDEN

W. B. SELLMER

IS DUE

HERE TODAY

*He Might Be Watching You Now**Are You Hunting or Fishing Within the Law? IF NOT*

Can you afford to have your reputation ruined by a fish or game violation?

Can you afford to be recognized as a fish or game hog by the public?

Can you afford the publicity usually given such a violator?

Can you afford to be branded as an unreliable and untrustworthy citizen?

Can you afford to pay a heavy fine or serve a jail sentence?

YOU CAN NOT!

DON'T TAKE A CHANCE

Such a reminder may set many a violator to thinking. The results will be watched with interest.

THE LIFE HISTORY OF THE GRUNION.

The highly specialized spawning habits of the grunion or "little smelt" are very different to those of other known fishes. In fact, its adaptation of the tides and its method of laying its eggs to protect them from marine enemies is one of the really remarkable stories in the annals of natural history.

Fish Bulletin No. 10, a contribution from the State Fisheries Laboratory entitled "The Life History of *Leuresthes tenuis*, an Atherine Fish with Tide Controlled Spawning Habits" by Frances N. Clark is a continuation of the work begun by W. F. Thompson.*

During the months of March, April, May and June, or after the highest tide, this fish comes in on the sandy beaches of California to spawn. The female lays her eggs several inches below the surface of the sand and far above the level of the average tide.

Although in this way the eggs escape the dangers of the sea, certain enemies less formidable confront the larvae of the grunion. The *Saprinus sulcifrons*, a beetle, boring its way into the sand, often uncovers and devours them. But the greatest dangers are to be found in physical conditions. Should the sand so dry out that the eggs lose their moisture, should they be swept out to sea too soon after spawning, or should they fail

* Thompson, W. F., 1919. The Spawning of the Grunion, *Leuresthes tenuis*. California Fish and Game Commission, Fish Bull. No. 3.

to be liberated from the sand at the proper time—these are the real dangers to which the eggs are subject. But the fish is usually able to escape these perils. It runs in with the highest waves shortly after the full moon which enables it to reach the area where the sand is being deposited. This prevents the eggs from being washed out by succeeding tides. The tides accompanying the dark of the moon just two weeks after the spawning are very much higher and uncover and liberate the larvae.

Experiments have proven that the larvae can not liberate themselves from the sand, but must await the action of the waves for their deliverance. They are capable of lying in their capsules for two weeks after the proper time for hatching (an unusual phenomenon) but this is injurious and results in the failure of many of the young to survive. So the failure of the tide to reach them at their normal hatching time and deliver them constitutes a grave danger.

Miss Clark has brought out in her paper the following new facts in regard to the life history of the grunion:

1. Growth of the ova toward maturity begins as early as January and continues throughout the spawning season.

2. As soon as one batch of eggs matures and is spawned out, another batch begins to develop, is matured, and spawned out two weeks later. Thus, after an individual fish starts spawning it continues to spawn periodically on each series of high tides throughout the breeding season.

3. The interval between spawnings is apparently fifteen days instead of two weeks. This condition results in the fishes spawning on later and lower tides during the higher series of high tides than on the lower series of high tides.

By a study of the scales and length-frequency data, it was found that *Leuresthes* matures at the end of the first year. For the population studied, approximately 25 per cent of the fish spawn again at the end of the second year and 7 per cent at the end of the third year. No fish were found spawning at the end of the fourth year.

Leuresthes grows rapidly during the first year, the males reaching an average length of 110 mm. and the females of 119 mm. After the first year and the resulting attainment of sexual maturity, increase in length falls off rapidly, but increase in weight continues at only a slightly diminished rate.

As a result of the long protracted spawning season, growth of the mature fish ceases during the months of May, June and July, and is resumed again in

the fall. This cessation of growth during the summer months results in the formation of a breeding annulus on the scales. Growth continues during the winter and a winter annulus is formed only in rare cases.

CALIFORNIA'S GAME BIRDS ENJOY WINTER IN ALASKA.

A notable scarcity of such migratory wild fowl as ducks and geese occurred during the recent fall and winter flight in a number of the western states, particularly in California. Sportsmen and others interested in the conservation of our wild life have expressed alarm at this scarcity, fearing that this indicates a permanent decrease in the numbers of these birds.

The Biological Survey of the United States Department of Agriculture recalls, however, that there was a notably large northward flight of birds in the spring of 1925, and that the situation looks far more serious than it is. The warm winter on the coast of British Columbia and southern Alaska is without parallel. No snow is reported below the 1000-foot level in the very region of southeastern Alaska where a year ago deer were starving owing to the heavy snowfall which buried their food.

Telegraphic reports to the Biological Survey during the third week of January, 1926, showed an unprecedented number of ducks and geese remaining along the coast of southern Alaska and northern British Columbia. An abundance of ducks and geese has been noted as far north as the flats about the mouths of the Copper and Bering rivers. From Wrangell, Alaska, come reports of many ducks and geese on the flats near there, and the Stikine River flats in northern British Columbia are reported to be free of snow and ice. A wireless dated January 22 from the Alaska Game Commission advised the Biological Survey that large numbers of mallards and thousands of geese were on the Stikine flats, a remarkable occurrence for this time of the year.

The scarcity of birds in various parts of the west during the fall and winter of 1925 and 1926 does not necessarily mean a corresponding actual decrease in the total number of the existing wild fowl. Mild fall and winter weather in southern Canada and along the northern border of the United States and the deficient rainfall in the west have caused erratic movements among these birds, many of their usual haunts having been passed over by them in the southward flight.

The fact that millions of birds are

reported on some of the large wintering grounds in the southern parts of the country is evidence that vast numbers of them have come down from the north.

BACK TO PRIMITIVE METHODS.

A newspaper item states that three archers invaded the Siskiyou Mountains during the deer season. We must at least admit that hunters so armed must use greater skill in securing their game, and certainly the more ingenuity one puts into the hunt the more he gets out of it, at least in mental stimulus. With both high school and college students practicing archery, it may well be that the bow and arrow will have to be considered in future legislation. At present no game laws mention this sort of weapon.

ORGANIZATION SEEKS LIMITATION OF FIREARMS.

Branding firearms as mere aids to reds, robbers, bandits and hold-ups, certain organizations attempt to curtail the use of weapons. Discovering that one-half million revolvers are delivered in the United States mails annually, one organization plans to ask congress for a law making pistols and revolvers nonmailable, and would place the issuing of permits to purchase revolvers under authority of the United States Army. The organization which supports this point of view is called "The American Reclamation Society, Inc." Its last advertising campaign was made through literature of a well known milling company. The movement is said to be nation wide.

Undoubtedly there is need for more care in the use of dangerous weapons, but the constitution of the United States guarantees to every man a chance to defend himself. There are few who grant that this society is taking the proper means to improve conditions.

FOOD OF PHALAROPES, AVOCETS AND STILTS.

Phalaropes have long claimed interest by bird students because the males are plainly garbed, incubate the eggs and rear the young. Anyone who has watched these birds as they spin and dab on the surface of the water has speculated as to their food. A recent bulletin (U. S. D. A. department bulletin 1359) brings interesting information relative to the food of these birds. The northern phalarope is a fairly common migrant in California. According to the results of stomach examination, the food of this bird is made up almost entirely of animal matter, beetles and flies being taken in largest quantities. Some small weed seeds

are also consumed. Most of the the food is of slight economic importance as the forms taken are of no significance in relation to crops or other products. However, during May and June, large quantities of mosquito larvae are consumed. The food of two summer visitant birds which frequent alkali ponds in the interior valleys is given in the same bulletin.

The avocet appears to be a notable destroyer of weevils and the black-necked stilt of bill bugs. This comment is made on the avocet as a game bird: "In some regions the 'snipe,' as the avocet is sometimes known, is considered a game bird or is hunted for food. Shooting avocets has no element of sport, however, as it is easy to walk within gun range of them, and they are fearless and frequently come around to examine the hunter. Though the birds are of fair size, the flesh is not savory and offers no excuse for killing them. They rightfully have been removed from the category of game birds and are now accorded full protection under the regulations of the federal migratory-bird treaty act. This is fortunate indeed for their continuance, as they are large and conspicuous and easily killed. They rear but one brood of four young each season and are subject normally to many dangers, so that with shooting the species would soon be exterminated. With increase in cultivation of lands throughout their range their haunts have been much restricted. The birds remaining have in many instances been brought into closer relation with man, so that the good they do is more apparent."

In that these shore birds usually arrive long after the hunting season has closed, and depart before the fall opening, they are accorded fair protection in California.

COMMITTEE TO INVESTIGATE STATUS OF RUFFED GROUSE.

The periodic cycles of scarcity and abundance of the ruffed grouse in eastern states has been the subject of conversation among sportsmen for many years, but until recently there has been no serious attempt to solve this fundamental problem. An investigation committee was appointed by the American Game Protective Association in December, 1924. Two workers on the problem, Dr. A. A. Allen of Cornell University, and Dr. A. O. Gross of Bowdoin College, are obtaining valuable data. In October, 1925, the Massachusetts Fish and Game Protective Association formed a subsidiary committee and this committee hopes to raise a fund of \$10,000 to carry on an

investigation over a period of years. The radio is being used as a means of interesting persons in the investigations and of securing the necessary specimens for the use of the scientists actually engaged in the work.

PROPOSED SANCTUARY FOR WILD ANIMALS IN SOUTH AFRICA.

A bill for the permanent establishment of a great national park and sanctuary for wild animals will come before the union government of South Africa. Hopes are entertained that a final obstacle, the presence of some privately owned land within the scheduled area, will be overcome, and that the union, by passing the bill, will create an asset of the highest commercial, popular and scientific value.

The Transvaal, in which the proposed park is situated, has the credit of being the first state in Africa to realize the importance of protecting wild life. In March, 1898, two years before the conference of African powers called by the late Lord Salisbury led to the establishment of reserves and sanctuaries in many parts of Africa, the Transvaal government had set apart a district on the Sabi River between the Drakensberg Mountains and the Lebombo Hills adjoining Portuguese East Africa, as a sanctuary in which it was forbidden to "hunt, shoot, seek or in any way to intimidate, to chase or to drive, or in any way disturb any game or birds in the game reserve."

The country is known as low veld or bush veld. From east to west it rises in height gradually from about 400 feet above sea level to about 2000 feet. It is subtropical climatically, and consists of a series of undulating ridges and steep-cut water courses forest clad except below the 1200 foot level, where it becomes savannah country with rocky outcrops, the home of troops of baboons. There are a few large perennial rivers flowing from west to east and a multitude of tributary water courses, most of them now as a result of the gradual desiccation of South Africa dry except during the rains.

In 1923, under pressure from the companies, the government excised the whole western area of the reserve, amounting to about 1,500,000 acres, between the Olifants River on the north and the Crocodile River on the south.

There remain about seventy farms within the area which are still private property, and it is the acquisition of these at a fair price that is the final obstacle to be overcome. If these are purchased and the remaining area of the original reserve permanently established by the

union government as a national park and sanctuary, as contemplated by the bill, South Africa will gain possession of one of the greatest reserves in the world.—*Science*, Aug. 14, 1925.

VIREOS DESERVE ENCOURAGEMENT.

During the summer almost anywhere in the United States at least one species of vireo, and usually more than one, is to be found fitting about in the trees or shrubbery. In the east and central regions the common species is the red-eyed vireo, but the white-eyed, warbling, and yellow-throated vireos also are abundant. The Philadelphia, blue-headed, hutton and Bell vireos are more or less widely distributed. As with other common species of birds, the question as to whether or not vireos are beneficial is legitimately raised, and to answer it, the Biological Survey of the United States Department of Agriculture has made a study of their food habits, by examining the stomach contents of a great many of these birds.

The conclusions reached are set forth in a recent report (Department Bulletin 1355), "Food Habits of the Vireos: A Family of Insectivorous Birds." The food of the several vireos is shown to be very similar though sometimes varying in proportions. Most of the insects eaten are either neutral or definitely injurious in their economic relations, and may be placed on the credit side of the account of these birds. All vireos are especially fond of caterpillars. Scale insects are a notable item of vireo food, and other tree pests are freely eaten. Many destructive weevils were found in the stomachs examined, including such forms as the clover-leaf, clover-root, cotton-boll, and nut weevils, the plum curculio and bark beetles. Vireos also destroy ants and grasshoppers. Useful insects taken by the vireos include some of the hymenopterans, predacious bugs, and beetles, among which are ladybird beetles, which are almost uniformly beneficial. Although it is regretted that vireos consume as many ladybirds as the evidence indicates, yet they also devour many of the pests attacked by the ladybird, which must, in part excuse them. As fruit-eaters the vireos are practically harmless.

Those interested in the bulletin may obtain a copy, while the supply lasts, by writing to the United States Department of Agriculture at Washington, D. C.

CONSERVATION OF WILD LIFE PRESENTS COMPLEX PROBLEMS.

To protect the lives of the useful or harmless wild animals and birds of the country and at the same time to guard growing crops and livestock against depredations of injurious wild life is the com-

plex problem in conservation which the Biological Survey of the United States Department of Agriculture is constantly facing and attempting to solve. The services of this bureau become more important as time goes on and the scope of its organization is enlarging accordingly. Especially has this been the case during the fiscal year ended June 30, 1925, according to the annual report of the chief of the Biological Survey.

The increasing occupation and development of the United States, says Doctor Nelson, make it increasingly difficult to maintain even a fair representation of the once enormous natural resources in game and fur-bearing animals and game and insectivorous birds in this country. At the same time, the wide-spread herds of domestic stock and the extension of the farming areas have given predatory animals and harmful rodents of many species an abundant food supply, under the influence of which their numbers increase and necessitate active control.

To accomplish the varied tasks involved in these problems calls for field and laboratory investigational work by trained specialists, and the maintenance of warden service to safeguard federal wild-life refuges and to enforce federal game laws, as well as a force to conduct field campaigns to control wild animal and occasional bird pests.

The economic phases of the bureau's work have included operations for the control of predatory animals, chiefly in the west. Skilled hunters have been detailed to take these destructive animals wherever they occur, and to patrol borders especially in Arizona and New Mexico for animals coming across the international boundary. That predatory animals have been considerably reduced in numbers is shown by the fact that 352 wolves were taken, 37,255 coyotes, 228 mountain lions, 2945 bobcats, and 61 Canada lynxes. In addition probably twice as many coyotes were killed in poisoning campaigns. Measures to reduce the numbers of coyotes and bobcats have also served to check the spread of rabies, which is carried by these animals. In cooperation with state extension services and other state and private organizations, constant warfare is waged by the Biological Survey against injurious rodents, which consume vast quantities of grain and grasses in the West.

The study and conservation of fur-bearing animals, for many years one of the projects of the bureau, has been since July 1, 1924, designated as a separate division of fur resources. Under this division is maintained an experimental fur farm at Saratoga Springs, N. Y., for investigational work in the propagation of fur-bearing animals in captivity.

The Alaska game law, passed by the last session of the 68th congress, provided for the establishment of an Alaska Game Commission of five members, all residents of Alaska, and one of them the chief representative of the Biological Survey in the territory. The resident commissioners appointed by the Secretary of Agriculture to enforce the law and the regulations promulgated by him will have available for their use the vast store of information on birds and mammals in the files of the department and the cooperation of the Biological Survey.

The appropriation of funds by congress for the establishment of the Upper Mississippi River Wild Life and Fish Refuge, extending for about 300 miles between Rock Island, Ill., and Wabasha, Minn., has brought the number of federal wild-life reservations under the jurisdiction of the Biological Survey to 70. These refuges and preserves for wild birds and animals are distributed over the United States, and in Porto Rico, Hawaii and Alaska, and constitute an extensive phase of the conservation work of the bureau.

Copies of the annual report of the Bureau of Biological Survey may be had, while the supply lasts, by addressing the United States Department of Agriculture, Washington, D. C.

A FISHERMAN TO HIS SON.

By MAURICE M. FRINK.

My son, when you have older grown
I'll take you to a lake I've known
At midnight, noontime, dusk and dawn;
I want to show you where I've gone
To find my freedom—where I've spent
Days of gladness and content.
I want to be in the boat with you
When the bass are hitting—want you to
Learn from me,
O son of mine,
How to swing
A fishing line!

I've been young—too well I know
The rocky road your feet must go.
But I know, too, a path that clings
To wooded hill where the peewee sings,
Where dogwood grows, and oak and pine;
And all I ask, O son of mine,
Is to row a boat for you some day
Along that shore where the willows sway—
To be with you
When first you feel
A leaping bass
Unwind your reel!

I want my son to sleep, as I
Have slept, beneath the sky—
I want the day's first gleaming dim
To waken something deep in him;
I want my boy to learn to take
His troubles to that shining lake
And lose them there. And so I wish,
O son of mine, that you may fish!
For my boy's sake
I ask it, God—
Teach him to love
A casting rod!

FACTS OF CURRENT INTEREST.

At Medicine Lake the forest ranger reported 76 deer killed during the first twelve days of the open season.



From Audubon societies and women's clubs have come many protests against the new law passed by the last legislature which took protection from the cormorant and white pelican. The California brown pelican still receives protection.



Considerable complaint was made by deer hunters because present laws allow no legal method of taking deer from an open district into a closed district. Much was made of the possible waste of venison because of the restriction, but little of the added protection afforded deer.



The new state game farm at Yountville is now a reality. Equipment is installed and over a thousand pheasants have been hatched.



An investigation as to the cause of death of deer in the epidemic in northern Sonoma County has been instituted.



Last fall an attempt was made to market in San Francisco several barrels of cold storage game birds from South America. Three varieties of tinamous were identified in the shipment, including the famous large rufous tinamou.



During October and November, the educational department of the commission gave twenty-two lectures, most of them at schools, with a total attendance of 8650.

COMMERCIAL FISHERY NOTES.

N. B. SCOFIELD, Editor.

PURSE SEINING IN SOUTHERN CALIFORNIA.

When the new law relative to purse seine boats went into effect in southern California, it no doubt made things look pretty blue for the purse seine boat owner. As it was these boats were getting most of their revenue from the barracuda catch. On seeing that it was unlawful to take barracuda with the purse seine, they immediately began to look for some other way to use these boats and nets. Some of them went to Mexico, chartered a barge, which they anchored down there to leave their nets on (we would not let them bring barracuda in here with net on boat) and have been going to Mexico for barracuda ever since. Some of the boats appear to be doing well. When they prohibited the taking of barracuda in our waters, the price went up, there naturally being a scarcity. The gill netters are making pretty fair catches now and they will eventually be able to supply the market in good shape.

Quite a few of the purse seine boats have been used this summer for tender boats carrying tuna and skipjack from the barges in Mexico to San Pedro and San Diego. This sardine season there will be something like twenty purse seine boats fishing sardines with the purse seine. There are about six of them operating now and about fifteen more getting ready. I think that very likely they will revolutionize the method of catching sardines. They seem to have better luck catching them than the Jap boats and the packers say that they come in in better shape.

A few of the purse seine boats thought that they would try out the law but found that it did not pay after being convicted several different times. The purse seiners do not blame anyone but themselves for passage of this law, as they will admit that they were asleep at the switch, and did not put up any opposition at the Legislature. It was not a Fish and Game Commission bill, but was sponsored and really put through by the gill net fishermen.

For awhile after the law became effective purse seine boats could be bought pretty cheap, but now since they have found they can do fairly well on the Mexican fishing and can catch sardines, it is a different story.

I believe that the purse seine boat can

be used in other ways, such as the long line for gill netting, fishing for albacore off shore at a greater distance than the smaller boats can go, and in fact I think they might be adapted to most any kind of fishing for which the smaller boat is used. Our fishery is now growing into larger type boats and I think the larger boats will eventually displace the smaller ones.—H. B. Nidever.

A CLOSED SEASON FOR NORTHERN HALIBUT.

A closed season has been placed on Pacific coast halibut from November 15th to February 15th, by the International Halibut Commission. Under the order of this commission it is unlawful to catch halibut on the Pacific coast of North America or to land them at any port in the United States or Canada during the closed time. It is provided that halibut caught accidentally while fishing for other fish may be utilized by the crews on the boats for food while at sea but any such halibut on board the fishing boat must be turned over to the federal authorities immediately upon landing.

This order does not apply to the fish known as California halibut or bastard halibut which is a large flounder and not a halibut, but it does apply to the large northern halibut which is occasionally caught by fishermen in northern California waters and by the trawlers operating out of San Francisco.

FROZEN FISH IMPORTED FROM JAPAN.

On January 29th in Sacramento in the Japanese fish markets there were six consignments of fresh fish imported from Japan by four different markets. The fish were semifrozen. One species is known as the snapper. It has a sheeps-head head and nose almost milk white in color and weighs about three-fourths of a pound. It sold in the markets for eighty cents a pound. The other species known by the Japanese as a kajouro resembles a barracuda and is almost eleven inches long, very slim and delicate. These sold for seven cents per fish, each weighing less than one-half a pound apiece. As long as I have been on the commission, I have never seen a shipment of fresh fish from Japan.—W. J. Green, Sacramento, California.

CONSERVATION IN OTHER STATES.

MINNESOTA PLANS TO PLANT FINGERLINGS.

The Minnesota department of conservation is rapidly installing ponds in order to rear trout to the fingerling stage before planting. The plans to rear the fish to greater size are being undertaken because of the destructiveness of spring and early summer freshets on fry, and the fact that insufficient natural food exists in the streams in the early part of the season. During the past season it was necessary for two hatcheries to plant fry, owing to the high temperature of the water not permitting their retention to a later stage of growth.

BRITISH COLUMBIA TRIES ACCLIMATIZATION EXPERIMENTS.

According to an item appearing in the *Canadian Field Naturalist*, the Game Conservation Board of British Columbia, in its endeavor to improve game conditions, has introduced the muskrat on Vancouver Island. In the hope that the fur resources of the island may be improved a small number were trapped on the lower mainland and planted in various places. Four mountain goats secured from Banff, Alberta, in January, 1924, have been released in the elk reserve at Cowichan Lake, Vancouver Island. This is the beginning of a determined effort to acclimatize the Rocky Mountain goat on the island.

ILLINOIS NOW HAS DEPARTMENT OF CONSERVATION.

Illinois has added to its state organizations a Department of Conservation charged with the promotion of fishing, hunting, wild-life protection, dissemination of information concerning the industrial phases of wild-life conservation, reforestation and general forestry, and the prevention of pollution in Illinois streams and lakes. The bill provides for a director and an assistant director.—*American Forests and Forest Life*.

CONSERVATION AGENCIES REORGANIZED IN MINNESOTA.

Under a law enacted by the Minnesota legislature last session, a department of conservation becomes one of fourteen

departments to replace ninety-three boards, commissions and bureaus.

The new department of conservation includes a commissioner of forestry and fire prevention, a commissioner of game and fish, and the state auditor, who is to be commissioner of lands and timber *ex officio*.

The law provides that the commissioner of forestry and fire prevention shall be chairman of the department, and the governor has appointed State Forester Grover M. Conzet to this position. Mr. Conzet has been state forester for the past two years and has the confidence of the conservation interests of Minnesota.—*American Forests and Forest Life*.

ALABAMA INTRODUCES FORESTRY INTO THE PUBLIC SCHOOLS.

The elements of conservation are to be a required study in the schools of Alabama. Special emphasis will be placed on forestry as a subject.

MINNESOTA GAME DEPARTMENT USES SLED DOGS.

A team of huskies is owned by the State Game and Fish Department of Minnesota, for this is the only possible means of transportation for game wardens during winter weather in the northern part of the state. The team was secured primarily to aid in patrolling the Superior Refuge.

MICHIGAN VIOLATORS PAY HIGH PRICE FOR GAME.

According to a Michigan magazine, five Detroit Italian hunters paid \$463 for fourteen song birds they had killed. Each man paid a fifty dollar fine and costs, and their guns and car were confiscated. The seizure of automobiles carrying contraband game is made possible under a new statute. In another instance three hunters paid \$900 for killing a fawn doe weighing forty-five pounds. They were charged with killing and possessing deer out of season and with the possession of a headlight with which they "shined" their game. Each paid \$100 fine and costs, and the car and rifles seized were valued at \$600. Confiscation laws make law enforcement much easier.

LIFE HISTORY NOTES.**A HORNED DOE.**

On October 3, 1925, Mr. Roy Bullard of Reedley, Fresno County, killed a mule deer with well developed horns. At an elevation of about nine thousand feet, on the ridge between the middle and south fork of Kings River on the middle fork

nearly two hundred pounds, the buck being slightly the largest. The doe had three points and a nineteen-inch spread.

Three instances of horned does being taken have come to the notice of the Fish and Game Commission the past season. This one is apparently the largest on record.



FIG. 12. Four point buck and horned doe of mule deer with I. A. Jones at left and Roy Bullard of Reedley, the killer of the horned doe, at the right. Photograph October 3, 1925, by F. A. Bullard.

slope, two deer were seen together. One proved to be a doe with horns and the other taken by Mr. F. A. Bullard proved to be a four point buck. Both animals were in fine condition, and each weighed

In the accompanying photograph the horned doe is seen at the right with Mr. Roy Bullard in the background, and the buck at the left with Mr. I. A. Jones.—F. A. Bullard, Dunlap, Cal.

REPORTS.

FISH CASES.

July, August and September, 1925.

	Number Arrests	Fines Imposed	Jail Sentences (days)
Violations of Angling License Act.....	17	\$365 00	
Violations of Commercial Fishing License Act.....	40	475 00	
Trout: over bag limit.....	8	195 00	
Trout: closed district.....	2	100 00	
Striped bass: over bag limit; undersized.....	40	935 00	
Striped bass: sale, closed season.....	1	25 00	
Striped bass: spearing.....	1	100 00	
Salmon: illegal spearing.....	1	25 00	
Sturgeon: taking, possession.....	1	25 00	
Crabs: possession, females.....	1	25 00	
Crabs: closed season.....	3	100 00	
Clams: over bag limit; undersized.....	86	2,770 00	100
Abalones: over bag limit; undersized.....	26	820 00	
Abalones: taking with diving apparatus.....	1	50 00	
Barracuda: undersized.....	3	75 00	
Salt water eels: undersized.....	2	40 00	
Lobsters: closed season.....	4	80 00	
Fishing within 250 feet of fishways.....	4	100 00	
Illegal night fishing.....	1	30 00	
Obstructing streams; failure to maintain fish ladder.....	5	100 00	
Pollution of streams.....	1	50 00	
Nets: illegal possession or use.....	43	2,825 00	
Totals.....	291	9,310 00	100

GAME CASES.

July, August and September, 1925.

	Number Arrests	Fines Imposed	Jail Sentences (days)
Violations of Hunting License Act.....	47	\$630 00	
Deer: hunting, killing, possession, closed season.....	32	2,115 00	30
Deer: failure to retain skin-horns.....	11	1,000 00	50
Deer skins: evidence of sex removed.....	3	125 00	
Deer: over bag limit.....	1	150 00	
Deer: killing, possession; does, fawn, spike bucks.....	31	1,700 00	180
Ducks: killing, possession; closed season.....	17	415 00	2
Geese: killing, possession; closed season.....	3	75 00	
Mudhens: killing, possession; closed season.....	1	25 00	
Shorebirds: killing, possession.....	1	50 00	
Doves: killing, possession; closed season.....	16	463 00	
Quail: killing, possession; closed season.....	20	810 00	
Pheasants: killing, possession.....	1	100 00	
Sage-hens: killing, possession; closed season.....	1	25 00	
Non game birds: killing, possession.....	6	50 00	
Bear: killing, possession; closed season.....	3	50 00	
Squirrel: killing, possession.....	2	75 00	
Rabbits: cottontail, brush: killing, possession; closed season.....	13	310 00	
Night hunting.....	7	90 00	
Trespass.....	4	160 00	
Game refuge: hunting or possession of firearms.....	14	275 00	
Totals.....	234	8,693 00	262

STATEMENT OF INCOME.

For the Period July 1, 1925, to September 30, 1925, of the Seventy-seventh Fiscal Year.

License sales:	Detail	Total
Angling.....	\$129,888 00	
Hunting.....	41,257 00	
Market fishermen's.....	24,280 00	
Trapping 1925-1926.....	349 00	
Wholesale fish packers' and shell fish dealers'.....	895 00	
Game breeders.....	15 00	
Fish breeders.....	10 00	
Kelp.....	10 00	
Total license sales.....		\$196,704 00
Other income:		
Court fines.....	\$14,482 00	
Fish packers' tax.....	3,175 73	
Kelp tax.....	46	
Fish tag sales.....	1,866 68	
Game tag sales.....	21 48	
Sale of beaver hides.....	10 00	
Sale of nets and lines.....	186 00	
Abalone inspection.....	115 60	
Interest on bank deposits.....	971 46	
Total other income.....		\$20,829 31
Total income.....		\$217,533 31

STATEMENT OF EXPENDITURES.

For the Period July 1, 1925, to September 30, 1925, of the Seventy-seventh Fiscal Year.

Function	Materials and Supplies	Salaries and Wages	Service and Expense	Property and Equipment	Total
Administration:					
Commissioners.....			\$186 68		\$186 68
Executive offices.....	\$253 60	\$5,331 80	1,678 35	\$1,970 41	9,234 16
Printing.....	484 04				484 04
Research and publicity.....	21 10	1,345 00	201 63		1,567 73
Accident and death claims.....			178 94		178 94
Department totals.....	\$758 74	\$6,676 80	\$2,245 60	\$1,970 41	\$11,651 55
Commercial fish culture and conservation:					
Superintendence.....	\$46 24	\$2,565 00	\$794 94	\$3 00	\$3,409 18
Inspect on and patrol.....	1,224 40	4,911 70	1,267 46		7,403 56
Research.....	119 94	4,150 67	752 96	68 46	5,092 03
Statistics.....	247 50	1,681 88	90 05		2,019 43
Propagation and distribution of salmon.....	3,684 11	3,875 51	355 90	75 61	7,991 13
Department totals.....	\$5,322 19	\$17,184 76	\$3,261 31	\$147 07	\$25,915 33
Sporting fish culture:					
Superintendence.....	\$18 52	\$2,655 32	\$682 33		\$3,356 17
Special field investigations.....	5 55	600 00	329 35		934 90
Printing.....					
Propagation and distribution of trout.....	13,145 97	18,402 31	2,349 52	\$94 47	33,992 27
Department totals.....	\$13,170 04	\$21,657 63	\$3,361 20	\$94 47	\$38,283 34
Patrol and law enforcement:					
Prosecutions and allowances.....			\$42 10		\$42 10
General patrol.....	\$2,036 40	\$36,433 30	26,696 50	\$2 00	65,168 20
Department totals.....	\$2,036 40	\$36,433 30	\$26,738 60	\$2 00	\$65,210 30
Fish and game conservation:					
Game bird introduction.....	\$4,930 75	\$525 00	\$1,410 33		\$6,866 08
Printing.....	20 60				20 60
Game farms.....	2 30		102 55		104 85
Mountain lion hunting.....		375 00	133 92		508 92
Mountain lion bounties.....			760 00		760 00
State fair exhibit.....	3,148 04	127 50	977 76		4,253 30
Department totals.....	\$8,101 69	\$1,027 50	\$3,384 56		\$12,513 75
License commissions.....			\$5,376 10		\$5,376 10
Tahoe camping grounds.....	\$20 05	\$656 00	14 93	\$0 45	691 43
Grand totals.....	\$29,409 11	\$83,635 99	\$44,382 30	\$2,214 40	\$159,641 80

By Fish and Game Commission
Department of Commercial Fisheries

CALIFORNIA FRESH FISHERY PRODUCTS FOR MONTHS OF JULY, AUGUST AND SEPTEMBER, 1925.

Species of Fish	Del Norte, Humboldt.....	Mendocino, Sonoma, Lake...	Marin.....	Solano, Yolo.....	Sacramento, San Joaquin....	Alameda, Contra Costa...	San Francisco, San Mateo.....	Santa Cruz.....	Monterey.....	San Luis Obispo, Santa Barbara, Ventura.....	Los Angeles.....	Orange.....	San Diego, Imperial.....	Total.....	Mexican, brought into California via San Pedro....	Mexican, brought into California via San Diego....	Total Mexican brought into California.....
Albacore.....							19,432	61	60,504	4,000	15,755,780	32,729	3,892,218	19,764,724	21	105	126
Anchovies.....							22,562			20,854	8,978			23,840			
Barracuda.....											507,108	1,353	122,790	652,105	134,125	225,229	356,354
Bluefish.....														12,160			
Bonito.....	10						9,433			1,766				171,626			
Carp.....				15	314	6,682	13	1,338	10	4,399	493,173	1,723	69,049	569,905	4,474	4,459	8,933
Catfish.....		4,741		1,263	18,164	14,242								7,011			
Chilipepper.....							5,882	33,226	3,025					38,440			
Cultus Od.....							181,110	30,553	6,354					42,233			
Dolphin.....														243,849			
Eels.....							100							100			
Flounders.....							119,298	2,350	307					122,344			
Grayfish.....	130						10,037	400						34,208			
Greenfish.....																	
Hake.....							5,850	2,875	3,173	108,364	92,851	265	1,326	8,725	112,926	473,047	555,973
Halibut.....		40,034	827				3,211	819						8,725			
Hardhead.....														353,496			
Herring.....							225		11					236			
Kingfish.....							368	4,941	894		65,205	604	850	79,862			
Mackerel.....							416	4,173	565,546	9,508	354,546	18,690	44,187	997,066	151	1,876	2,027
Marlin.....																	
Mullet.....																	
Perch.....	15,445	60	2,562				16,749	1,229	4,231	221	34,602	930	3,021	3,021		3,782	3,782
Pike.....				4	15	343								79,492			
Pompano.....														362			
Rock Bass.....														1,786			
Rockfish.....	31,356	13,446					192,764	70,590	44,597	45	55,080	921	72,928	108,374		91	91
Sablefish.....	11,275						192,604	80,518		13,269	70,833	6,380	232,552	675,867			
Salmon.....	2,233,387	406,946					423,907	51,312	8,763		80			215,477			
Sardines.....				378,081	305,185	1,116,399	334,810	112,750	316		1,856			4,927,980			
Sculpin.....							238,994							449,732			
Sea Bass—Black.....								52	57,040,825	152	18,592	345	126,283	57,425,151			
Sea Bass—White.....											142,819	68	1,111	145,413			
Sea Trout.....											5,741	115	7,867	13,723	258	27,123	27,381
Shad.....											159,776	3,333	28,140	279,535	56,248	538,340	594,588
Shad—Buck.....				60	194		41,755	5,331	623	34,776			832	907			
Shad—Roe.....							75							3,456			
Sheephead.....							31							330			
Skates.....														14			
														3,651		410	410
														25,919			

Skipjack						7,760	32	4,478,290	1,539	2,473,671	6,961,292	653,054	889,724	1,542,778
Smelt	3,290	1,538	5,127	24,142	1,015	76,597	19,247	44,653	12,642	2,192	208,125	105	498	603
Sole	631	8,007		1,728,932	145	493,312	2,395	2,095	1,057		2,265,954	1,785		1,785
Spirital														
Striped Bass														
Sturgeon														
Suckers														
Surf Fish														
Swordfish														
Tomcod														
Trout—Farm	222					250		7,040	8,552		15,592	1,283	1,283	
Trout—Steelhead														
Tuna														
Tuna—Bluefin								255,495	550		256,045			
Tuna—Yellowfin								3,383,829	556	1,435	3,383,890			
Turbot								267,215	138	90,399	357,752	857,520	1,613,410	2,470,930
Whitebait	12,372													
Whitefish								9,937	12	25,301	33,239			180
Yellowtail								869,283	470	841,255	1,711,008	26,676	17,690	44,366
Miscellaneous	345							41,615	456		54,387	1,736		1,736
Total fish	2,425,216	488,183	16,898	383,067	325,240	1,246,769	57,857,238	242,850	85,112	8,008,768	102,894,451	1,849,259	3,797,067	5,646,326
Crustaceans														
Crabs														
Decapoda	125,008													
Hermit														
Shrimps														
Spiny Lobsters														
Mollusks														
Abalones														
Clams—Cockle														
Clams—Mixed	1,563	5,599	6,065											
Clams—Pismo														
Clams—Softshell														
Cuttlefish														
Limpets														
Mussels														
Oysters—Eastern														
Oysters—Native														
Snails														
Squid														
Miscellaneous														
Frogs (doz.)														
Terrapins (doz.)														
Turtles														
Totals	2,451,787	493,831	397,734	383,067	325,240	1,272,461	1,073,432	59,457,775	89,062	8,068,902	105,607,254	1,849,259	3,797,067	5,646,326

All amounts shown in pounds unless otherwise specified. Abalone and skipjack cleaned.

1 1042 dozen.
 2 77,775 shell oysters.
 3 11,611 dozen.
 4 543,400 shell oysters.

5 3 dozen.
 6 12,656 dozen.
 7 621,175 shell oysters.

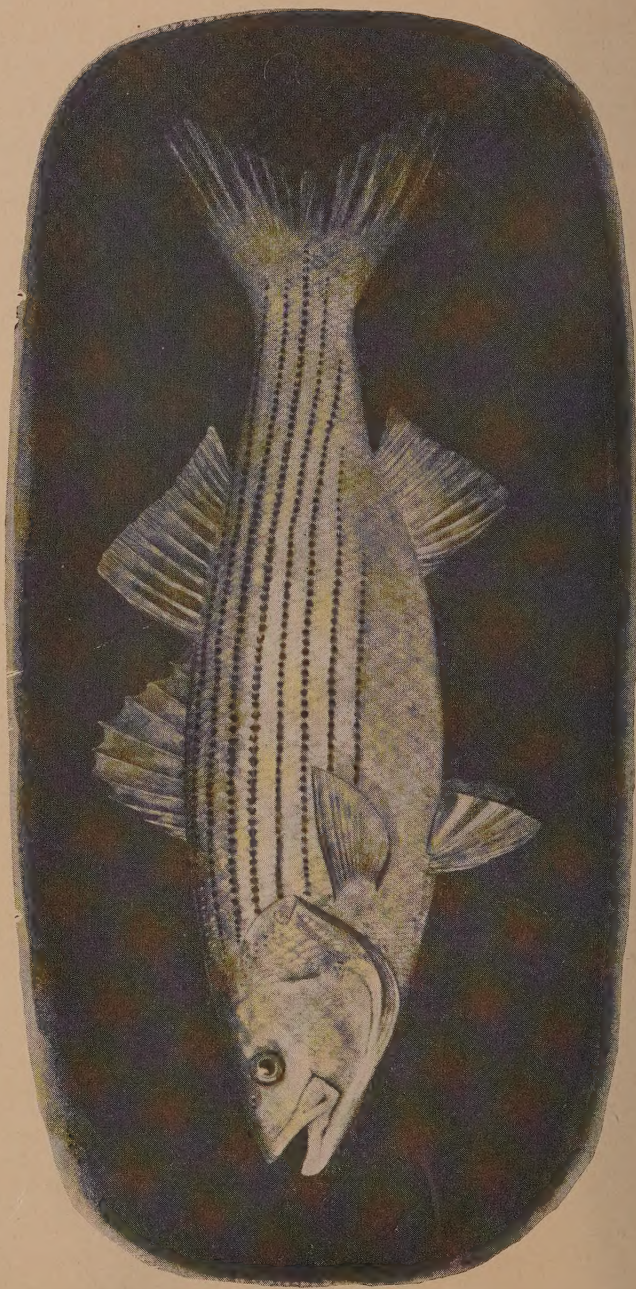


FIG. 13. Striped bass (*Morone saxatilis*) introduced into California in 1879 and now a notable food and game fish.